

COMPUTER:

RADIO SHACK® TRS-80 MODEL I (LEVEL II)

(INCLUDES COMPUTER MODEL 26-1001,
MONITOR MODEL 26-1201 AND EXPANSION
INTERFACE MODEL 26-1140)



TECHNICAL SERVICE DATA FOR YOUR COMPUTER



MODEL I LEVEL II

EXPANSION INTERFACE

See Folder CSCS3-A

MONITOR

See Folder CSCS3-B

SAFETY PRECAUTIONS

See page 19

PRELIMINARY SERVICE CHECKS

ENCLOSED

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PRELIMINARY SERVICE CHECKS

This data provides the user with a time-saving service tool designed for quick isolation and repair of computer system malfunctions.

Check all interconnecting cables for good connections and correct hookup before making service checks.

Disconnect all external peripherals from the computer system to eliminate possible external malfunctions.

Replacement or repair of Power Supplies, CPU (Main) Board, Expansion Interface Board and Monitor Boards or connectors may be necessary after the malfunction has been isolated.

MISCELLANEOUS ADJUSTMENTS

ROM SELECT SHUNT (Z3) CPU AND KEYBOARD

Rom Select Shunt (Z3) is set up in accordance to whether Level I or Level II Basic ROMs are installed. Use the following chart to determine which pins are shunted.

| Z3 PINS | LEVEL I BASIC | LEVEL II BASIC |
|------------|------------------|-------------------|
| 1-16 | Open | Shunted |
| 2-15 | Shunted | Shunted |
| 3-14 | Open | Shunted |
| 4-13 | Shunted | Shunted |
| 5-12 | Open | Shunted |
| 6-11 | Shunted | Shunted |
| 7-10 | Shunted | Shunted |
| 8-9 | Open | Shunted |

RAM SELECT SHUNT (Z71) CPU AND KEYBOARD

RAM Select Shunt (Z71) is set up in accordance to the amount of RAM memory (4K or 16K) installed on CPU Board. Use the following chart to determine which pins are shunted.

| Z71 PINS | 4K RAM | 16K RAM |
|-------------|-----------|------------|
| 1-16 | Open | Shunted |
| 2-15 | Shunted | Open |
| 3-14 | Open | Shunted |
| 4-13 | Shunted | Open |
| 5-12 | Open | Shunted |
| 6-11 | Shunted | Open |
| 7-10 | Open | Open |
| 8-9 | Open | Open |

12V AND 5V ADJUSTMENT CPU AND KEYBOARD

NOTE: Perform 12V adjustment before 5V adjustment.

Connect the input of a DC voltmeter to pin 3 of Regulator IC (Z2). Adjust the 12.0V Adjust Control (R10) for 11.9V.

Connect the input of a DC voltmeter to pin 3 of Regulator IC (Z1). Adjust the 5V Adjust Control (R5) for 5.0V.

12V AND 5V ADJUSTMENT EXPANSION INTERFACE

NOTE: Perform 12V adjustment before 5V adjustment.

Connect the input of a DC voltmeter to pin 3 of Regulator IC (Z20). Adjust the 12V Adjust Control (R7) for 11.9V.

Connect the input of a DC voltmeter to pin 3 of Regulator IC (Z21). Adjust the 5V Adjust Control (R8) for 5.0V.

HORIZONTAL AND VERTICAL CENTERING CPU AND KEYBOARD

Type and run the following Basic program to produce a rectangle on the Monitor screen:

```
10 CLS: FOR X=0 TO 127
20 IF X>47 THEN 40
30 SET (0,X): SET (127,X)
40 SET (X,0): SET (X,47)
50 NEXT X
60 GOTO 60
```

Adjust the Horizontal Center Control (R20) and Vertical Center Control (R21) to center the rectangle on the Monitor screen.

PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

SEE INTERCONNECTING DIAGRAM AND PHOTOS TO MATCH THE NUMBER IN THE CIRCLES WITH THOSE IN THE FOLLOWING DATA FOR SERVICE CHECKS TO BE PERFORMED.

1. POWER SUPPLY (CPU BOARD)

- (A) Disconnect the CPU Power Supply Module (PT1) from Connector J1A and check for 18.5VAC between pin 1 and pin 3 and 23.6V between pin 2 and pin 4 of the Power Supply Plug (P1A). If the voltages are missing, replace the Power Supply Module.
- (B) Check for 5.0V at pin 3 of Regulator IC (Z1). If the measurement is not correct, check the adjustment of the 5V Adjust Control (R5).
- (C) Check for 11.9V at pin 3 of Regulator IC (Z2). If the measurement is not correct, check the adjustment of the 12V Adjust Control (R10).

2. COMPUTER DOES NOT COME UP PROPERLY

- (A) See if the ROM Select Shunts (Z3) and RAM Select Shunts (Z71) have been set up properly, see "ROM Select Shunt Z3" section of Miscellaneous Adjustments.
- (B) Check Regulator IC (Z1) and Microprocessor IC (Z40) by substitution.
- (C) Check RAM ICs Z13 thru Z20 by substitution.

3. KEYBOARD

- (A) If only one key is not working properly, clean the key contacts with a spray contact cleaner. If the key is still defective, check for breaks at the key contacts and solder joints. Check the key contacts with an ohm meter.
- (B) If several keys are not working, check the ribbon cable between Keyboard and CPU board for possible open circuits.
- (C) If wrong character appears on the Monitor screen when a key is pressed. Check Character Generator IC (Z29) by substitution.

4. NO VIDEO ON MONITOR

- (A) Check the video cable for broken wires and the Video Connector (J2) for good connection.
- (B) Check the adjustment of the Contrast Control (R102) and Brightness Control (R103) located on the Monitor.

5. VIDEO DISPLAY NOT CENTERED ON MONITOR

- (A) Check the adjustment of the Horizontal Center Control (R20) and Vertical Center Control (R21) on the CPU Board, see "Horizontal and Vertical Centering" section of Miscellaneous Adjustments.

6. VIDEO DISPLAY UNSTABLE

- (A) Check the adjustment of the Horizontal Hold Coil (L4) and Vertical Hold Control (R13B) located on the rear of the Monitor.

7. MONITOR DEAD

- (A) Check Fuses F101 and F103 located inside the Monitor.

8. CASSETTE PORT INOPERATIVE

- (A) Check the Cassette cables for loose or broken wires and also check Connector J3 on CPU Board and Connectors J6, J7 and J8 on Expansion Interface Board for good connections.
- (B) If the Cassette motor will not stop running, turn the Computer Off. Use an ohm meter to check for an open circuit from the center pin at one end of Relay K1 to the center pin at the other end of Relay K1. If the pins are shorted, either Relay K1 contacts are sticking or Diodes CR9 and CR10 are shorted.

9. POWER SUPPLY (EXPANSION INTERFACE)

- (A) Disconnect the Expansion Interface Power Supply Module (PT1) from Connector J9 and check for 19.7VAC between pin 1 and pin 3 and 23.6V DC between pin 2 and pin 4 of the Power Supply Plug (P9). If the voltages are missing, replace the Power Supply Module.
- (B) Check for 11.9V at pin 3 of Regulator IC (Z20). If the measurement is incorrect, check the adjustment of the 12V Adjust Control (R7).
- (C) Check for 5.0V at pin 3 of Regulator IC (Z21). If the measurement is incorrect, check the adjustment of the 5V Adjust Control (R8).

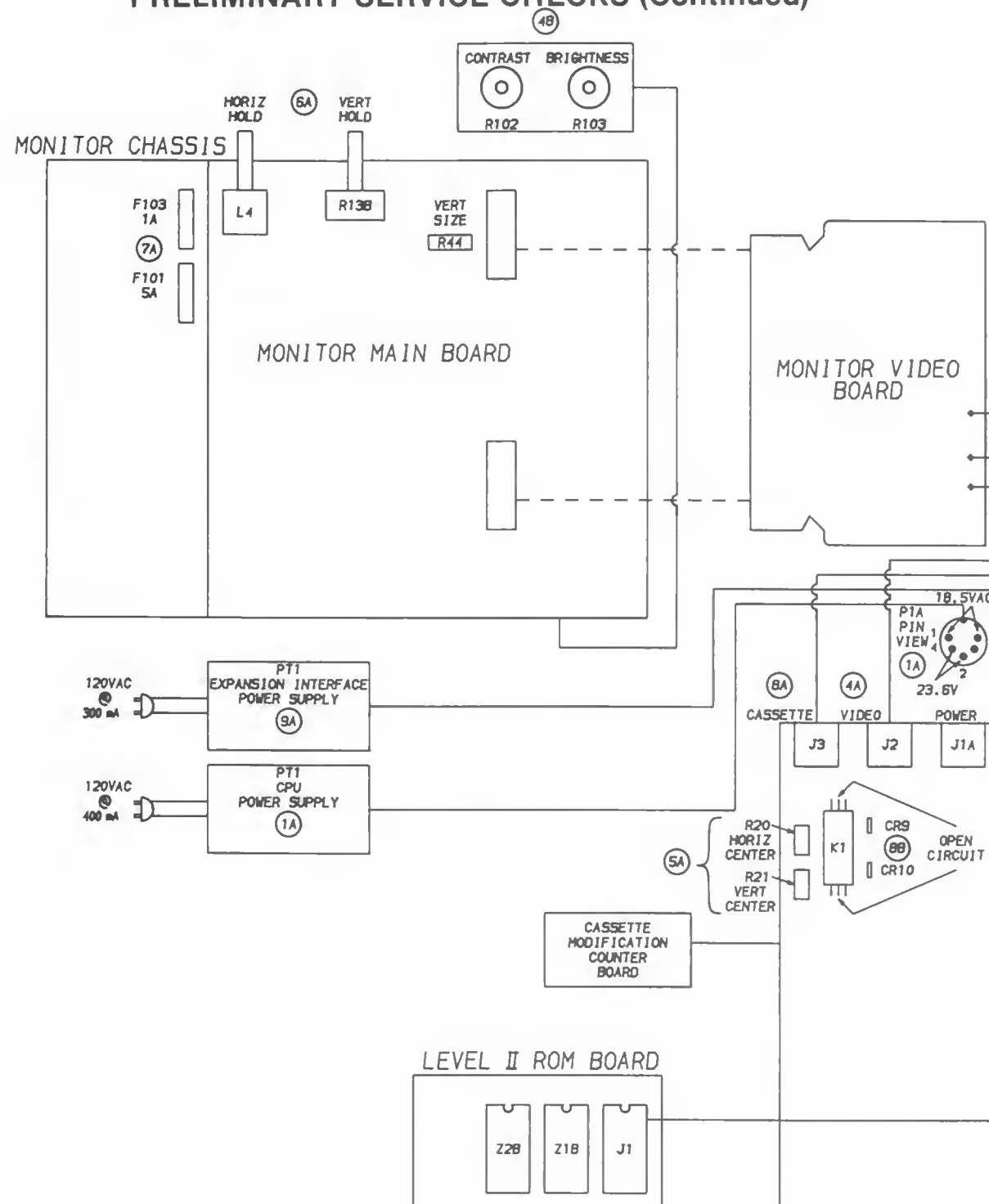
10. DISK DRIVE PORT INOPERATIVE (EXPANSION INTERFACE)

- (A) Check Disk Drive cables for loose or broken wires and Connector J5 for good connections. Clean Connector J5 contacts with a contact cleaner.
- (B) Check Disk Controller IC (Z42) by substitution.

11. LINE PRINTER PORT INOPERATIVE (EXPANSION INTERFACE)

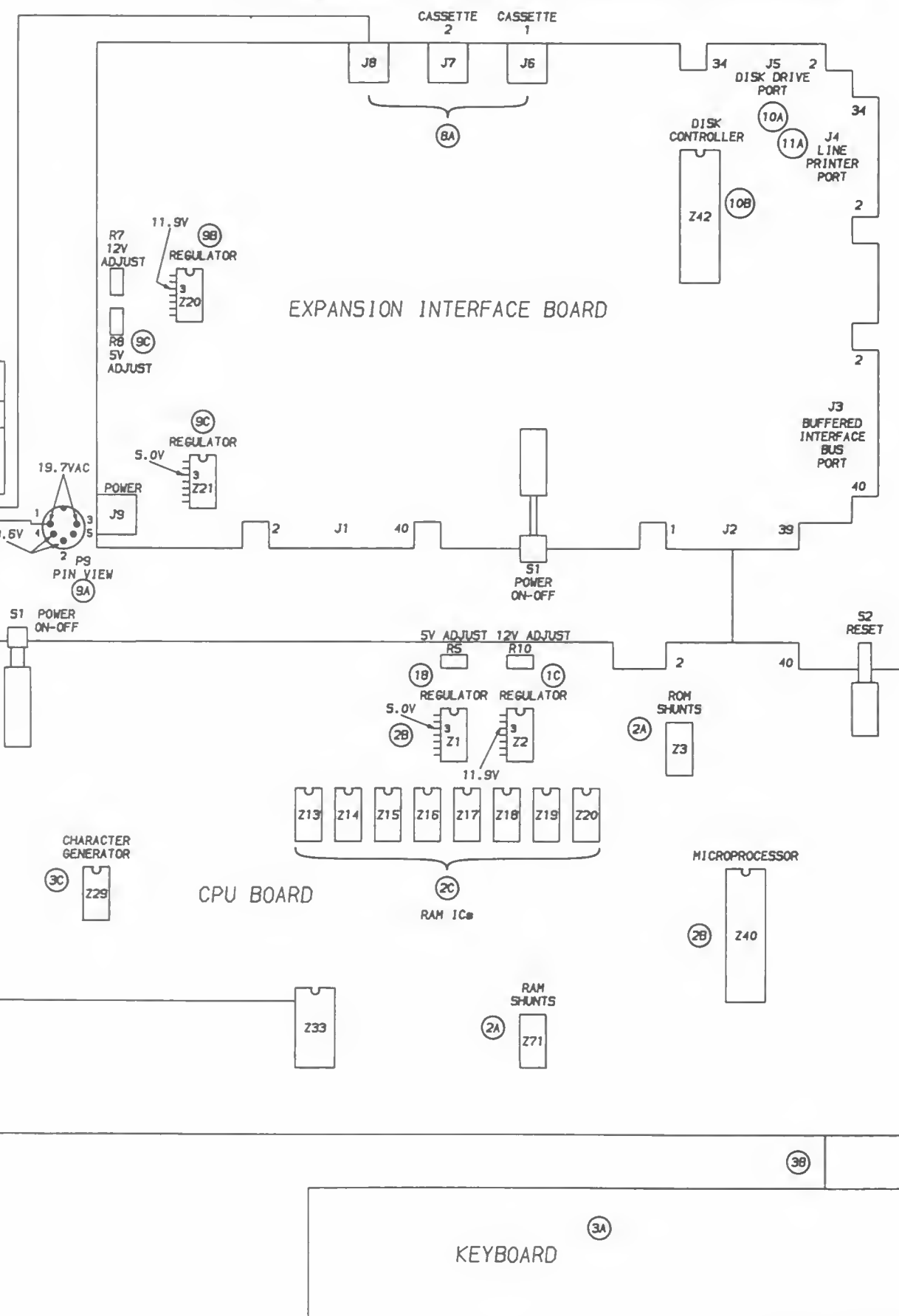
- (A) Check the Line Printer cable for loose or broken wires and Connector J4 for good connections. Clean Connector J4 contacts with a contact cleaner.

PRELIMINARY SERVICE CHECKS (Continued)



INTERCONNECTING DIAGRAM

PRELIMINARY SERVICE CHECKS (Continued)



PRELIMINARY SERVICE CHECKS (Continued)

GENERAL OPERATING INSTRUCTIONS

POWER UP (COMPUTER ONLY)

Turn On the Computer. The words "MEM SIZE?" will appear on the Monitor screen. Press the Enter key once. The word "READY" and a prompt character will appear on the Monitor screen. The Computer is now in Basic mode.

POWER UP SEQUENCE (WHEN USING DISK DRIVE)

1. Turn On the Expansion Interface.
2. Turn On the Disk Drives (Terminal Drive 26-1164A, first) and then any other peripherals.
3. Put a diskette (containing DOS, Disk Operating System) into Disk Drive 0. Turn On the Computer. The Computer will automatically boot up from Disk Drive 0. The version of the Disk Operating System will appear on the Monitor screen along with the words "DOS READY" and a prompt character.

NOTE: If an Expansion Interface unit is used without a Disk Drive, hold down Break key when turning On Computer. A double "MEM SIZE?" will appear on Monitor screen. Press Enter key and the word "READY" will appear followed by a prompt character. The Computer is now in Basic mode.

RESET

Press the Break key and the Reset button (on right rear of the Computer) to reset the Computer to Basic mode. If Disk Drives are attached, insert a diskette containing DOS information into Disk Drive 0 and press only the Reset button. This will reboot the Computer from Disk Drive 0.

DISK OPERATING SYSTEM (DOS)

Type DIR and press the Enter key to display a directory of programs that are on the diskette in Disk Drive 0. Type DIR : and the number of the Disk Drive holding the diskette which contains the information desired. Example: Type DIR :2 to list programs on diskette in Disk Drive 2.

To load a program from a diskette, type the name of the program and press the Enter key. Use a colon and the number of the Disk Drive which contains the program to be loaded. If no number is given, the system will assume Disk Drive 0.

NOTE: Basic program will not load from diskette unless the Computer is in the Disk Basic mode.

To get back to the DOS from Disk Basic mode, type

CMD"S" and press the Enter key. Any program in memory will be lost when leaving Basic mode by using "CMD"S".

DISK BASIC

To load Disk Basic into the Computer, boot up on DOS. Insert a diskette containing Disk Basic (usually a part of the DOS diskette) into Disk Drive 0, type BASIC, press the Enter key and follow prompts. To go from Disk Basic mode to DOS, type CMD"S" and press the Enter key. Any program in memory will be lost.

To load a program from a diskette, type LOAD and the program name enclosed in quotes and press the Enter key. To load from a Disk Drive other than Drive 0, add a colon and the Disk Drive number at the end of the program name. Example: LOAD "SAMS:1" for Disk Drive 1.

To save a program onto a diskette in a Disk Drive, type SAVE and the program name in quotes and press the Enter key. To save a program onto a diskette in a Disk Drive other than Disk Drive 0, add a colon and the Disk Drive number at the end of the program name. Example: SAVE "SAMS:1" for Disk Drive 1.

FORMATTING A DISKETTE

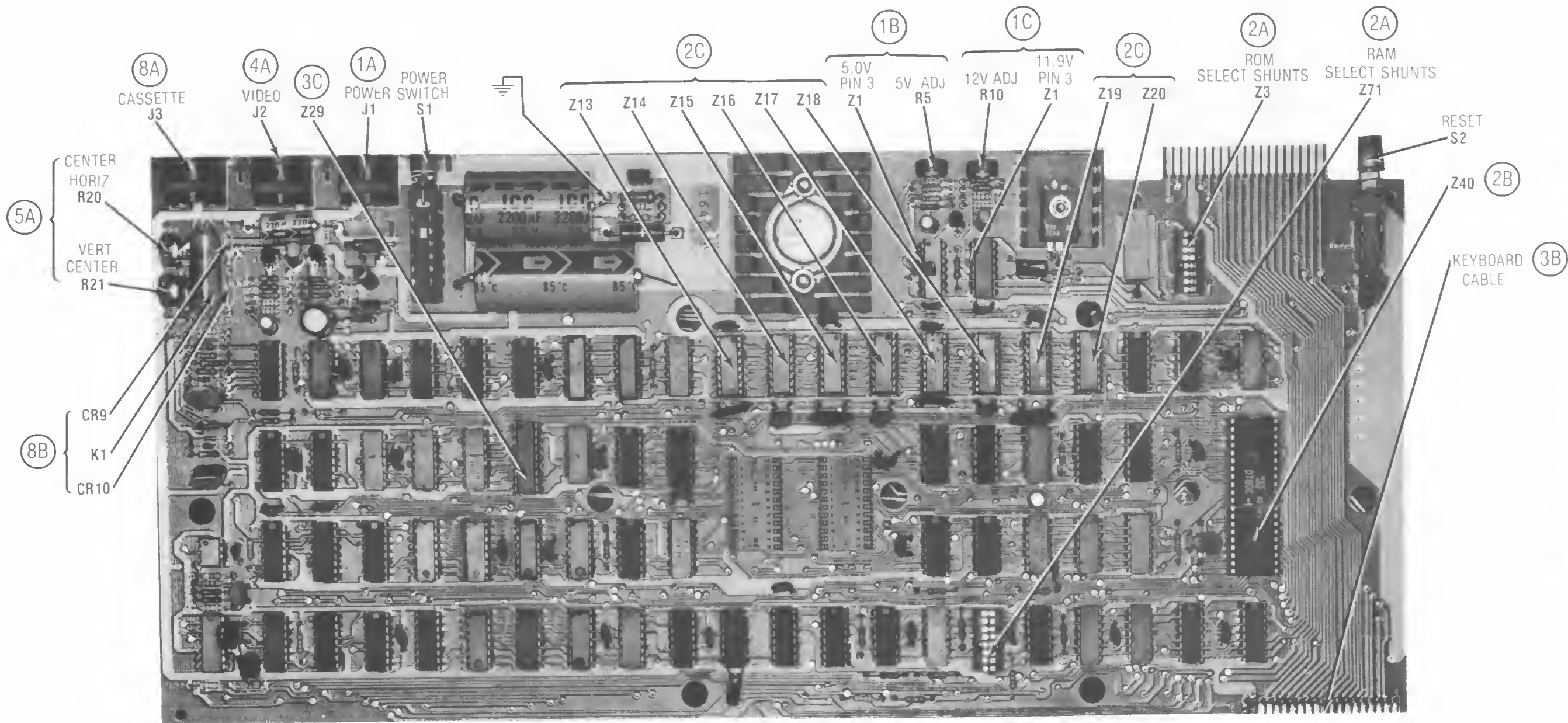
NOTE: This procedure does not copy Disk Operating System sections required for normal disk operations. A diskette thus formatted must be used only with systems containing 2 or more Disk Drives. Use "Back-up" function to format a diskette containing DOS information.

A blank diskette must be formatted before it can be used for saving data. To format a diskette, boot up on DOS, insert a diskette with the format program on it (usually part of the DOS diskette) into the Disk Drive, type FORMAT and press the Enter key. After the program has been loaded, insert a blank diskette into the Disk Drive and follow the instructions on the Monitor screen.

CASSETTE OPERATION

To load a program from tape, type CLOAD (with or without the program name enclosed in quotes), put the Recorder in play mode and press the Enter key. Prompt will indicate when program has been loaded.

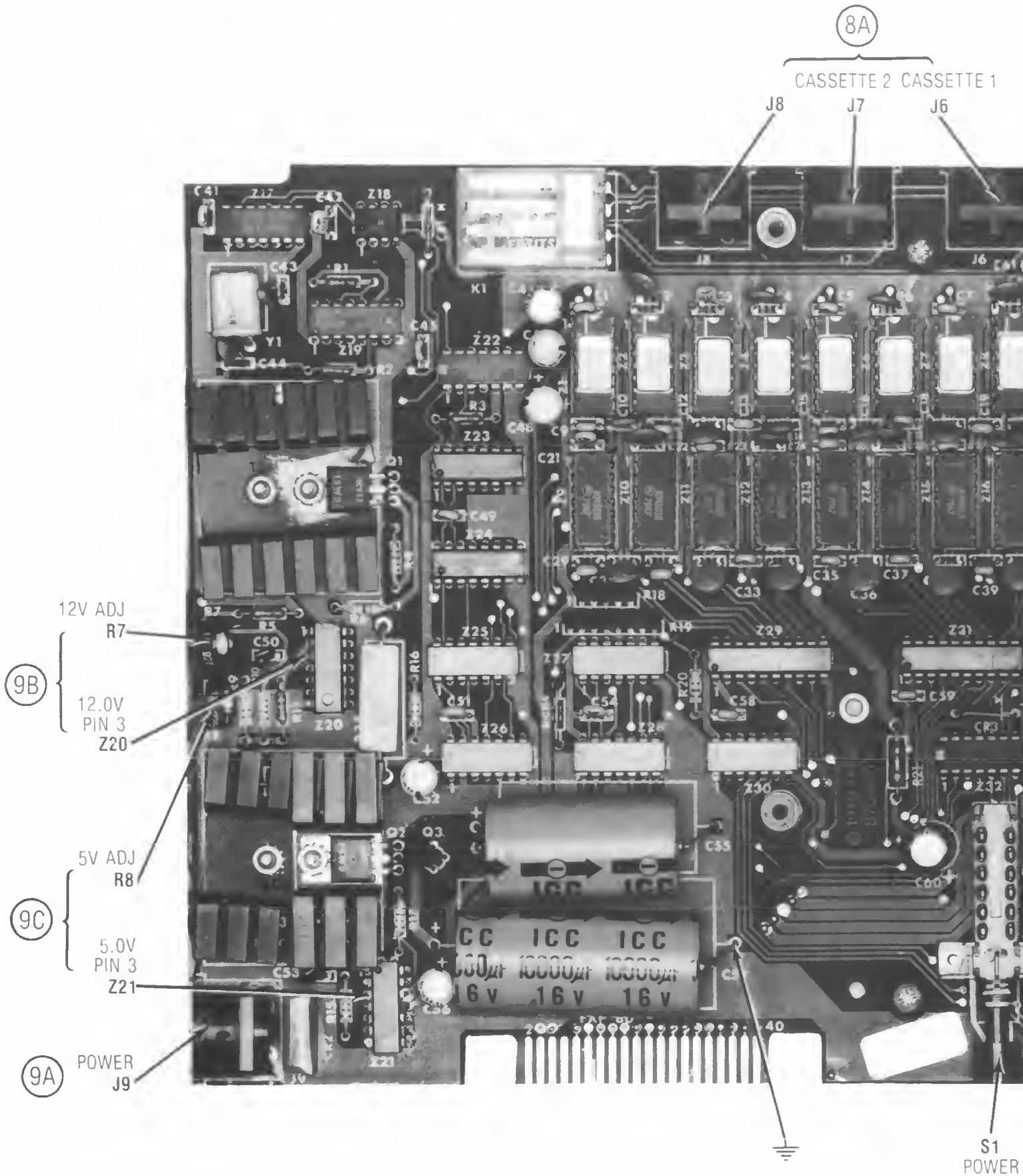
To save a program onto tape, save CSAVE (with or without the program name enclosed in quotes), put the Recorder in record mode and press the Enter key. A prompt will indicate when writing has been completed.



CSCS3

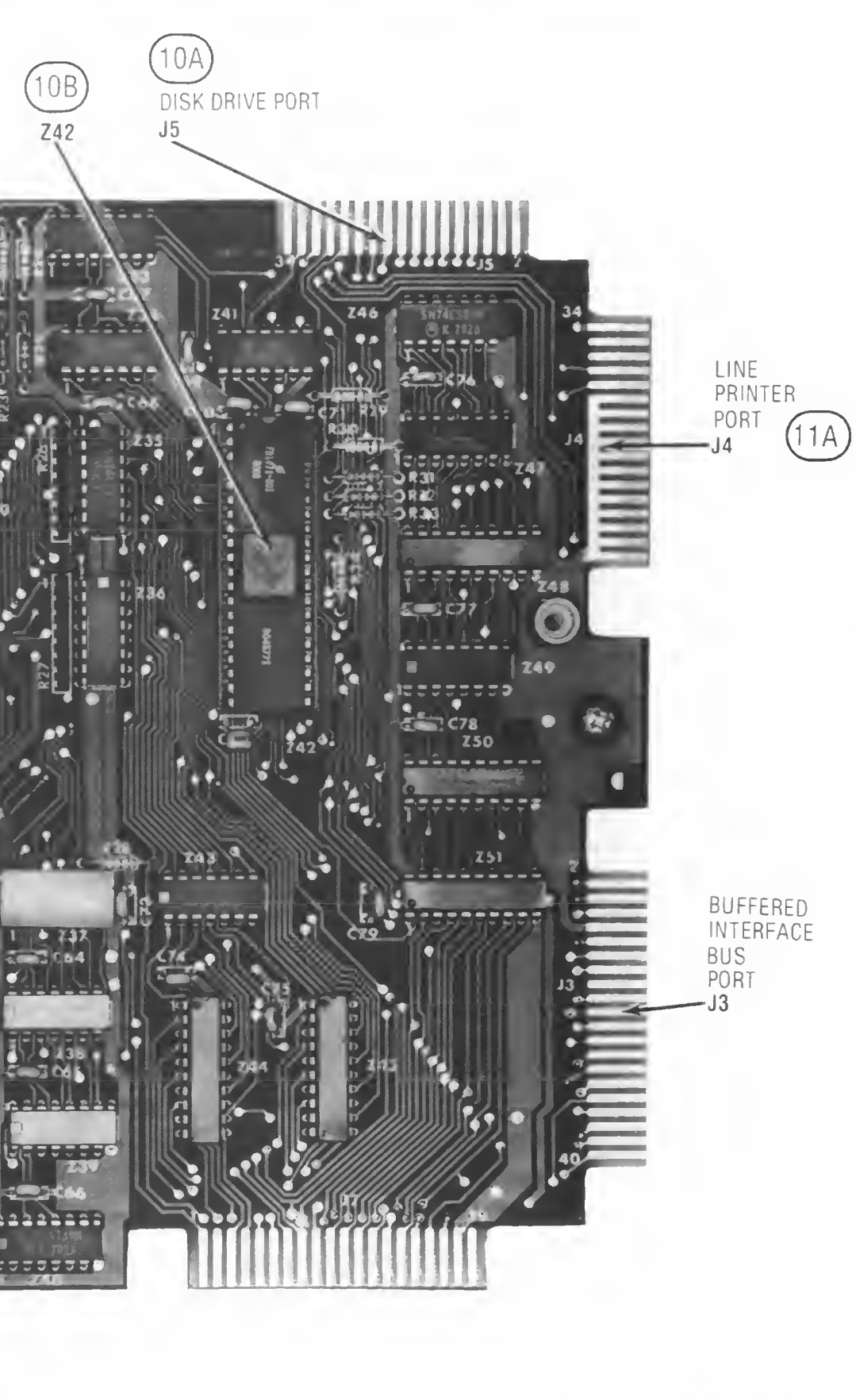
RADIO SHACK TRS-80
MODEL I LEVEL II

PRELIMINARY SERVICE CHECKS (Continued)



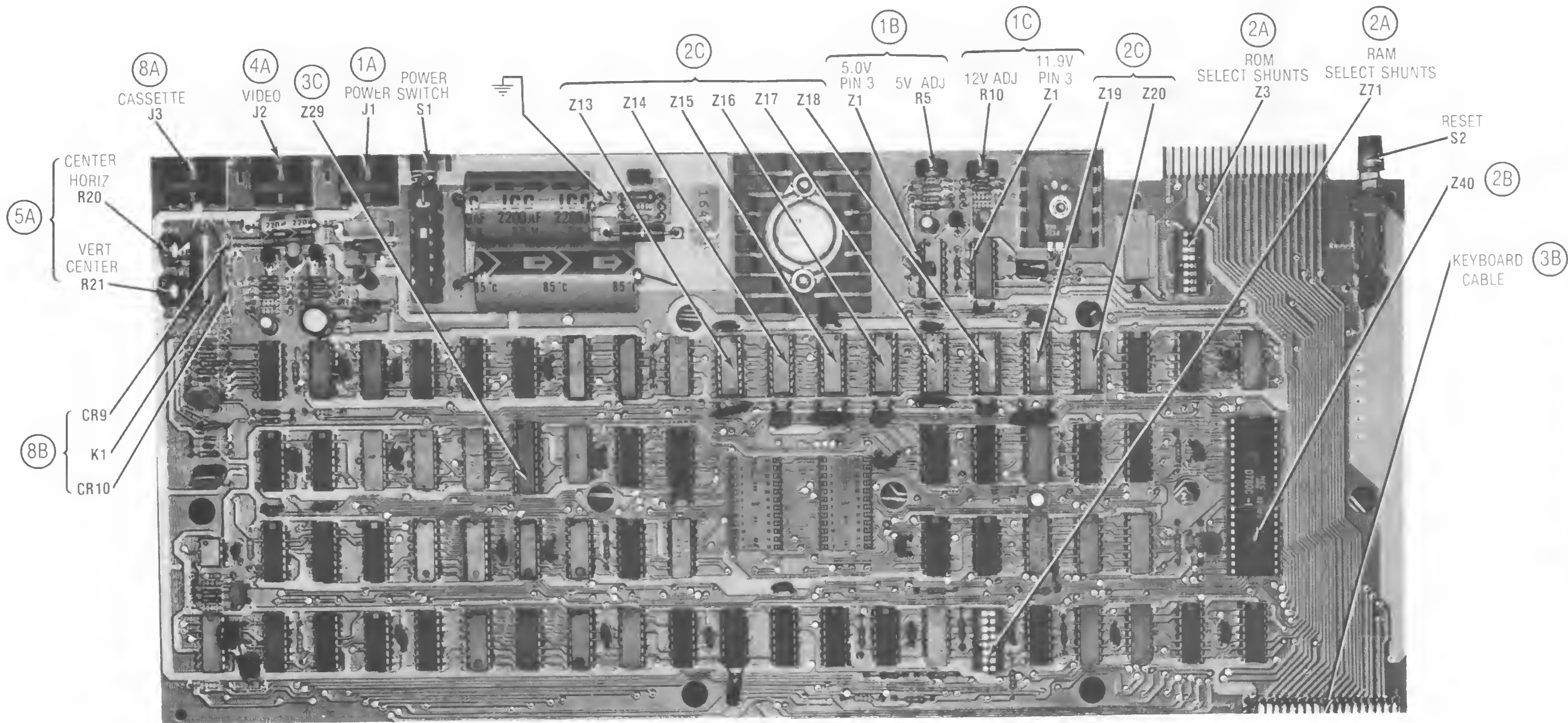
EXPANSION INTERFACE BOARD
VI

PRELIMINARY SERVICE CHECKS (Continued)



EXPANSION INTERFACE BOARD
VII

RADIO SHACK TRS-80
MODEL I LEVEL II



CSCS3

RADIO SHACK TRS-80
MODEL I LEVEL II

PRELIMINARY SERVICE CHECKS (Continued)

PREVENTATIVE MAINTENANCE

ENVIRONMENT

Computers perform best in a clean, cool area that is below 80 degrees Fahrenheit and free of dust and smoke particles. Even though home Computers are not affected by cigarette smoke as much as commercial Computers are affected, it is better to maintain a smoke-free area around the Computer. Do not block cabinet vents of any of the Computer system; Computer, Monitor, Printer, or other power devices.

ELECTRICAL POWER

Variations in the line voltage can affect the Computer. Try to avoid these fluctuations by using an AC receptacle that is on a power line not used by appliances or other heavy current demand devices. A power-surge protector, power-line conditioner, or non-interruptible power supply may be needed to cure the problem. **Do not** switch power On and Off frequently.

KEYBOARD

Liquids spilled into the Keyboard can ruin it. Immediately after a spill occurs, disconnect the Computer power plug from AC power outlet. Then, if circuitry or contacts are contaminated, disassemble the Keyboard and carefully rinse the Keyboard printed circuit board with distilled water and let it dry. Use a cotton swab to clean between the keys. Use a non-abrasive contact cleaner and lint-free wipers on accessible connectors and contacts.

DISK DRIVES

Clean the read/write heads of the Disk Drives about once a month or after 100 hours usage. Use only an approved head cleaning kit.

Handle carefully to preserve proper disk head alignment. A sudden bump or jolt to the Disk Drives can knock the disk head out of alignment. If the disk drive must be transported, place an old disk in slot and close door during transport.

Store disks in their protective covers and never touch the disk surface. Observe the disk handling precautions usually found on the back of disk protective covers.

PRINTERS

Carefully vacuum the Printer regularly. Wipe surface areas clean using a light all-purpose cleaner. Do not oil the machine. The oil will collect abrasive grit and dust. The dust will act as a blanket. This can cause components to overheat and fail.

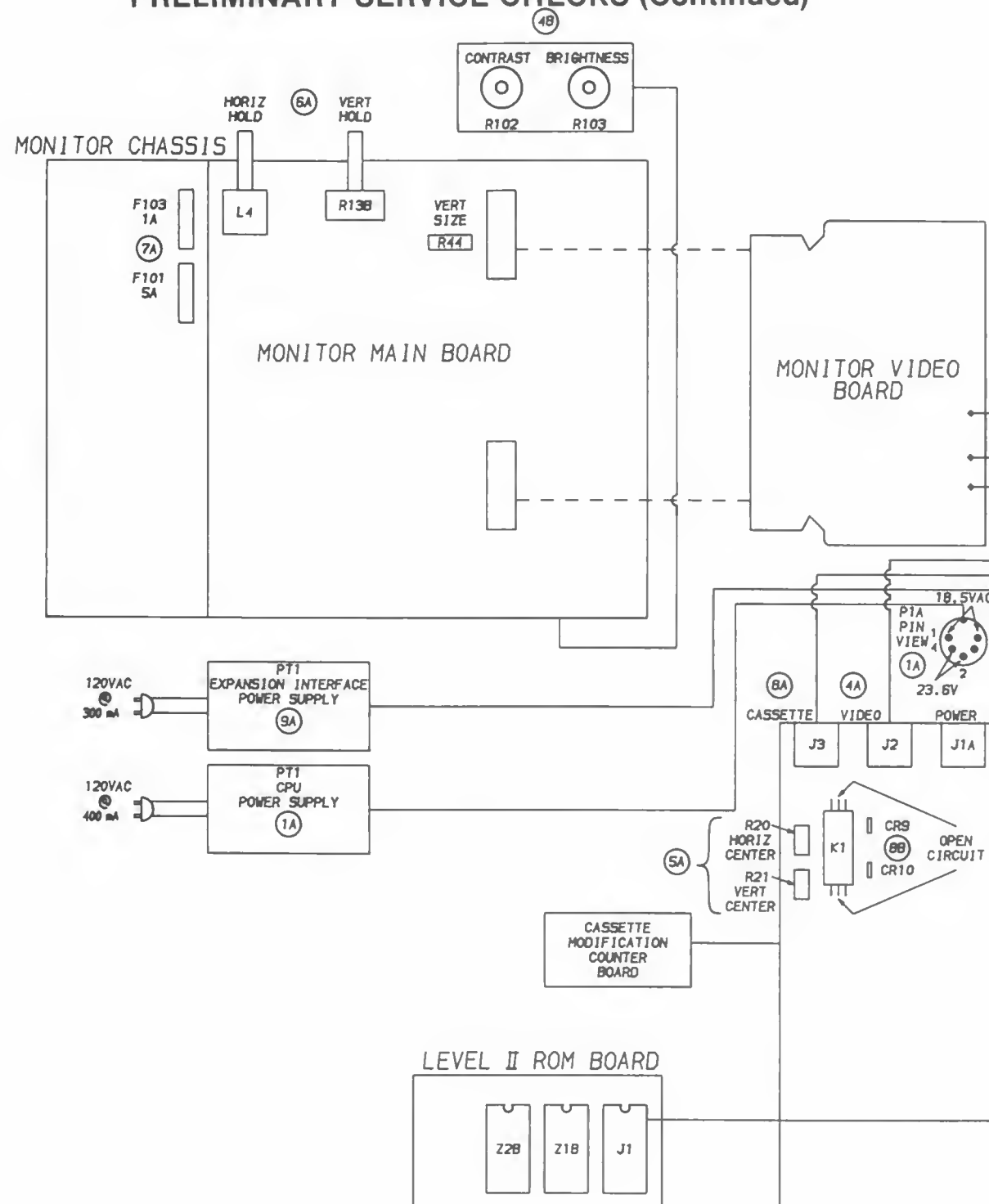
STATIC ELECTRICITY

Static electricity discharge can affect the Computer. In order to minimize the possibility, use anti-static mats, sprays, tools and materials, and maintain good humidity in the Computer environment.

MONITOR

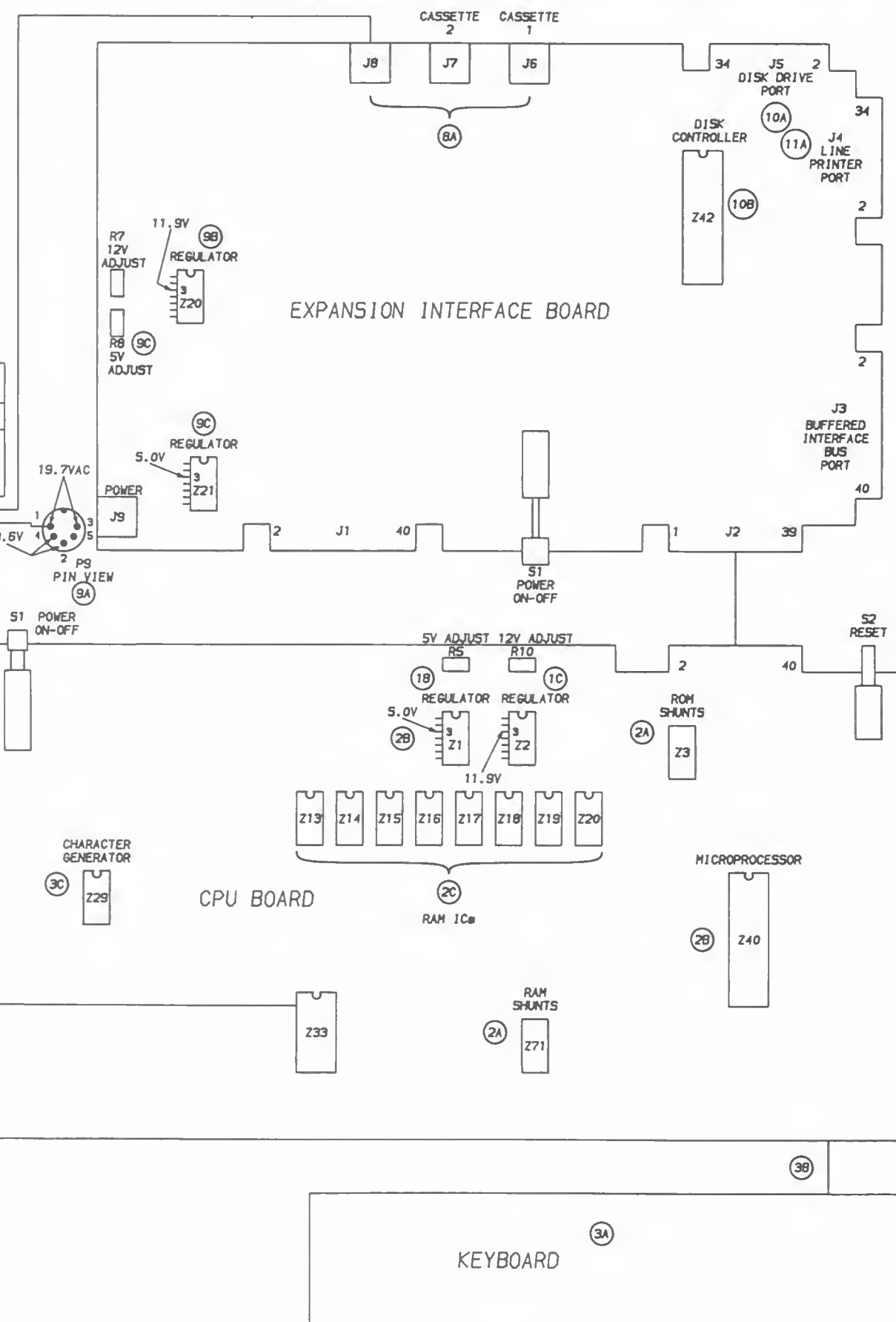
Use an isolation transformer with any Monitor that does not come as part of the system since some Monitors use a HOT chassis (chassis connected to one side of the AC line). The face of the Monitor should never be left on for long periods of time at high brightness level except when pattern is being changed periodically. Use caution when cleaning anti-glare screens, to preserve the glare-reduction feature.

PRELIMINARY SERVICE CHECKS (Continued)



INTERCONNECTING DIAGRAM

PRELIMINARY SERVICE CHECKS (Continued)



INTERCONNECTING DIAGRAM

PRELIMINARY SERVICE CHECKS (Continued)

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Logic Probe

TOOLS

Phillips Screwdriver
Small Screwdriver
Contact Cleaner
Low Voltage Soldering Iron
Desoldering Equipment

PARTS LIST AND DESCRIPTION

CPU BOARD

| ITEM | PART NO. | DESCRIPTION |
|----------|------------|---------------------------------------|
| CR9 | 4800026 | Diode, 1N982A |
| CR10 | 4800026 | Diode, 1N982A |
| K1 | 4500001 | Relay, Motor Control, 5V |
| PT1 | 4000004 | Power Supply Module |
| R5 | 4750019 | Control, 5V Adjust, 1000 Ohms |
| R10 | 4750019 | Control, 12V Adjust, 1000 Ohms |
| R20 | 4750018 | Control, Horizontal Center, 100K Ohms |
| R21 | 4750018 | Control, Vertical Center, 100K Ohms |
| Z1 | 3100001 | IC, Regulator, MC1723CP |
| Z2 | 3100001 | IC, Regulator, MC1723CP |
| Z3 | 2100041 | Shunt, ROM Select |
| Z13 | 3108009 | IC, RAM, MB8116E |
| thru Z20 | 3108003(1) | IC, RAM, |
| Z29 | | IC, Character Generator, 8046670 |
| | 3108001 | IC, Character Generator, MCM6670 |
| Z40 | | IC, Microprocessor, D780C-1 |
| | 3110001 | IC, Microprocessor, Z80 |
| Z71 | 2100041 | Shunt, RAM Select |

(1) Used in 4K versions

EXPANSION INTERFACE BOARD

| ITEM | PART NO. | DESCRIPTION |
|------|----------|---------------------------------|
| PT1 | 4000004 | Power Supply Module |
| R7 | 4750019 | Control, 12V Adjust, 1000 Ohms |
| R8 | 4750019 | Control, 5V Adjust, 1000 Ohms |
| Z20 | 3100001 | IC, Regulator, MC1723CP |
| Z21 | 3100001 | IC, Regulator, MC1723CP |
| Z42 | | IC, Disk Controller, FD1771B-01 |

MONITOR

| ITEM | PART NO. | DESCRIPTION |
|------|----------|-----------------------------------|
| F101 | 426973 | Fuse, 1A @ 250V, Fast Acting |
| F103 | 99328 | Fuse, 5A @ 250V, Fast Acting |
| L4 | 141017 | Coil Horizontal Hold |
| R13B | 141022 | Control, Vertical Hold, 200K Ohms |
| R102 | 140980 | Control, Contrast, 500 Ohms |
| R103 | 140711 | Control, Brightness, 200K Ohms |

RADIO SHACK TRS-80
MODEL I LEVEL II

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL CPU AND KEYBOARD

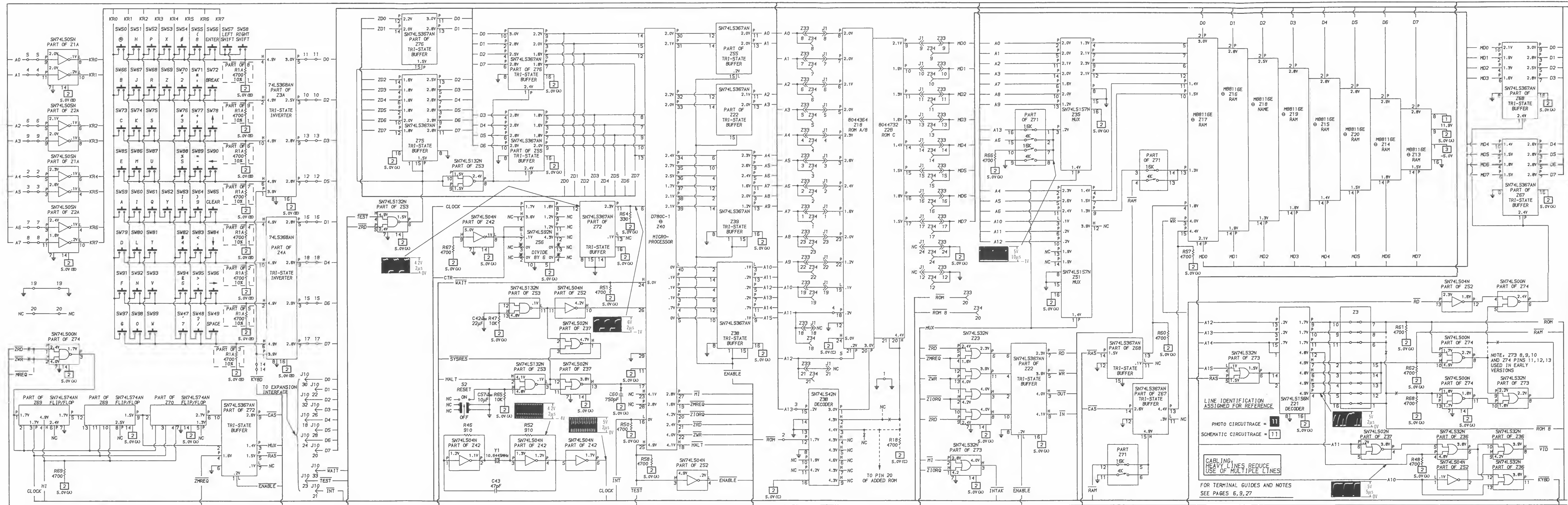
Remove six screws from cabinet bottom. Remove cabinet top and bottom from Keyboard and CPU Board. All components are now accessible for service.

CABINET REMOVAL EXPANSION INTERFACE

Remove six screws from cabinet bottom. Remove cabinet bottom from unit. All components are now accessible for service.

CABINET REMOVAL MONITOR

Remove five screws holding cabinet back and remove back. All components are now accessible for service.



GENERAL OPERATING INSTRUCTIONS

POWER UP (COMPUTER ONLY)

Turn On the Computer. The words "MEM SIZE?" will appear on the Monitor screen. Press the Enter key once. The word "READY" and a prompt character will appear on the Monitor screen. The Computer is now in Basic mode.

POWER UP SEQUENCE (WHEN USING DISK DRIVE)

1. Turn On the Expansion Interface.
2. Turn On the Disk Drives (Terminal Drive 26-1164A, first) and then any other peripherals.
3. Put a diskette (containing DOS, Disk Operating System) into Disk Drive 0. Turn On the Computer. The Computer will automatically boot up from Disk Drive 0. The version of the Disk Operating System will appear on the Monitor screen along with the words "DOS READY" and a prompt character.

NOTE: If an Expansion Interface unit is used without a Disk Drive, hold down Break key when turning On Computer. A double "MEM SIZE?" will appear on Monitor screen. Press Enter key and the word "READY" will appear followed by a prompt character. The Computer is now in Basic mode.

RESET

Press the Break key and the Reset button (on right rear of the Computer) to reset the Computer to Basic mode. If Disk Drives are attached, insert a diskette containing DOS information into Disk Drive 0 and press only the Reset button. This will reboot the Computer from Disk Drive 0.

DISK OPERATING SYSTEM (DOS)

Type DIR and press the Enter key to display a directory of programs that are on the diskette in Disk Drive 0. Type DIR : and the number of the Disk Drive holding the diskette which contains the information desired. Example: Type DIR :2 to list programs on diskette in Disk Drive 2.

To load a program from a diskette, type the name of the program and press the Enter key. Use a colon and the number of the Disk Drive which contains the program to be loaded. If no number is given, the system will assume Disk Drive 0.

NOTE: Basic program will not load from diskette unless the Computer is in the Disk Basic mode.

To get back to the DOS from Disk Basic mode, type

CMD"S" and press the Enter key. Any program in memory will be lost when leaving Basic mode by using "CMD"S".

DISK BASIC

To load Disk Basic into the Computer, boot up on DOS. Insert a diskette containing Disk Basic (usually a part of the DOS diskette) into Disk Drive 0, type BASIC, press the Enter key and follow prompts. To go from Disk Basic mode to DOS, type CMD"S" and press the Enter key. Any program in memory will be lost.

To load a program from a diskette, type LOAD and the program name enclosed in quotes and press the Enter key. To load from a Disk Drive other than Drive 0, add a colon and the Disk Drive number at the end of the program name. Example: LOAD "SAMS:1" for Disk Drive 1.

To save a program onto a diskette in a Disk Drive, type SAVE and the program name in quotes and press the Enter key. To save a program onto a diskette in a Disk Drive other than Disk Drive 0, add a colon and the Disk Drive number at the end of the program name. Example: SAVE "SAMS:1" for Disk Drive 1.

FORMATTING A DISKETTE

NOTE: This procedure does not copy Disk Operating System sections required for normal disk operations. A diskette thus formatted must be used only with systems containing 2 or more Disk Drives. Use "Back-up" function to format a diskette containing DOS information.

A blank diskette must be formatted before it can be used for saving data. To format a diskette, boot up on DOS, insert a diskette with the format program on it (usually part of the DOS diskette) into the Disk Drive, type FORMAT and press the Enter key. After the program has been loaded, insert a blank diskette into the Disk Drive and follow the instructions on the Monitor screen.

CASSETTE OPERATION

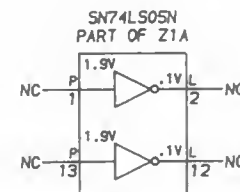
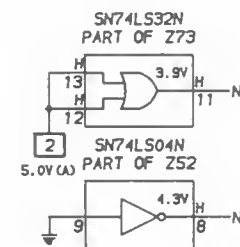
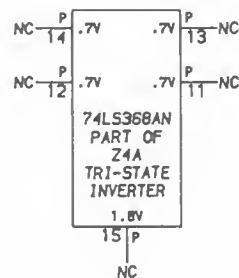
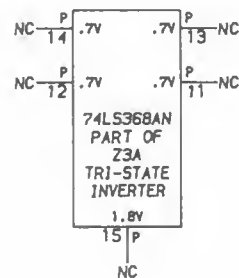
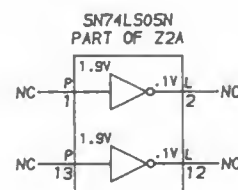
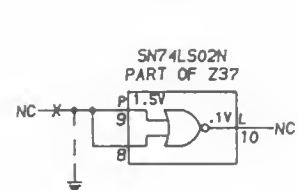
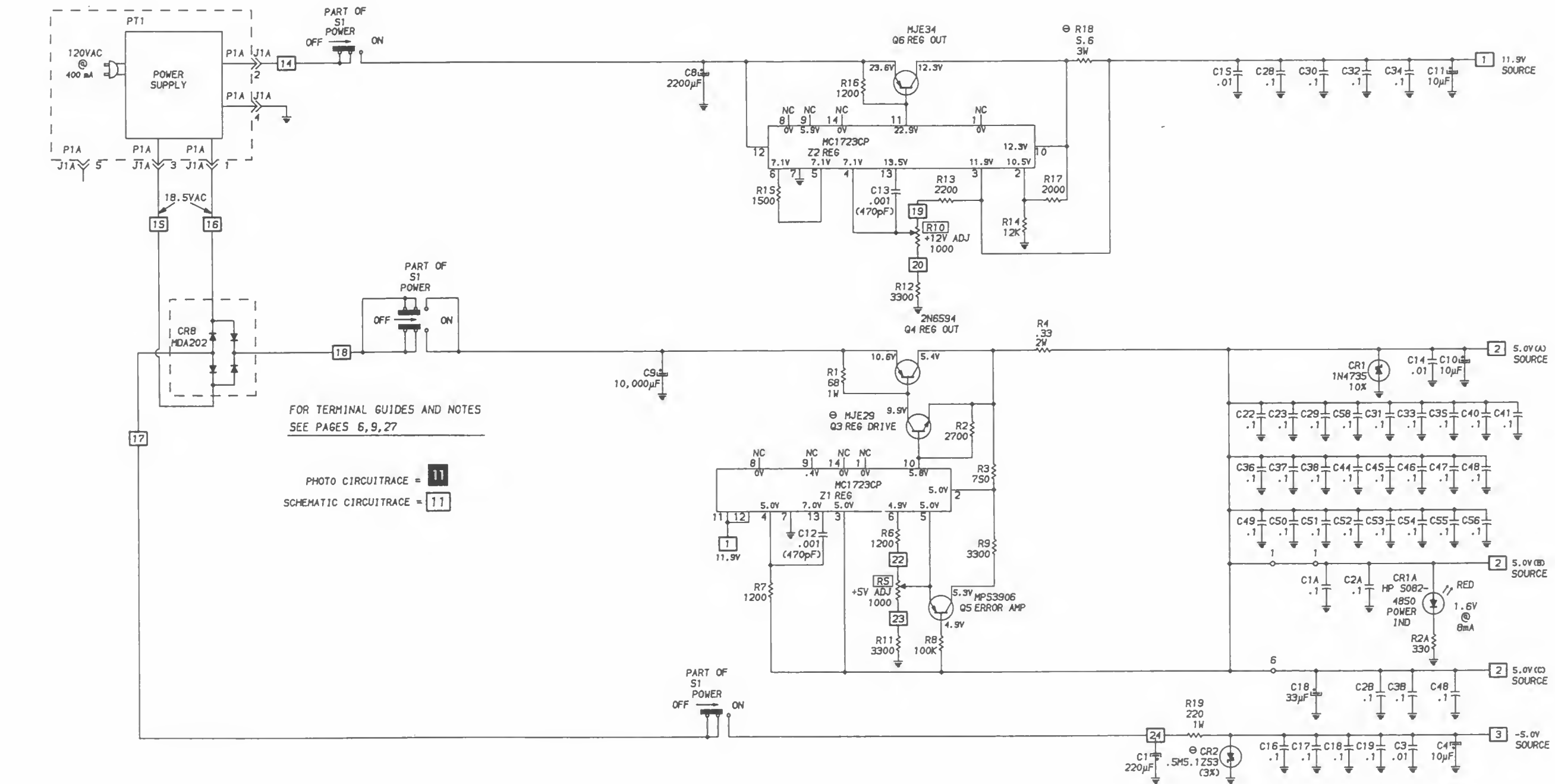
To load a program from tape, type CLOAD (with or without the program name enclosed in quotes), put the Recorder in play mode and press the Enter key. Prompt will indicate when program has been loaded.

To save a program onto tape, save CSAVE (with or without the program name enclosed in quotes), put the Recorder in record mode and press the Enter key. A prompt will indicate when writing has been completed.

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

Remove six screws from cabinet bottom. Remove cabinet top and bottom from Keyboard and CPU Board. All components are now accessible for service.



TROUBLESHOOTING

POWER SUPPLY

Computer is dead. Disconnect the Power Supply (PT1) from the CPU Board. Check for 18.5VAC between pin 1 and pin 3 of Connector J1A and 23.6V between pin 4 and pin 2 of Connector J1A. If the voltages are missing, check the cable and connections at Connector J1A and check for open AC power cord. If the correct voltages are present, reconnect the Power Supply to the CPU Board and turn On the Computer. Check for 5.0V at pin 3 of Regulator IC (Z1), 11.9V at pin 3 of Regulator IC (Z2) and -5.0V at the anode of Zener Diode CR2. If all the voltages are missing, check the Power Switch (S1).

If 5.0V is missing, check the voltages and components associated with Regulator Output Transistor (Q4), Regulator Drive Transistor (Q3), Error Amp Transistor (Q5) and pins 2 thru 7, 10, 11 and 13 of IC Z1. If the 5.0V is incorrect, check the adjustment of the 5V Adjust Control (R5), refer to "Miscellaneous Adjustments".

If the 11.9V is missing, check the voltages and components associated with Regulator Output Transistor (Q6) and pins 2 thru 7, 10, 11 and 13 of IC Z2. If the 11.9V is incorrect, check the adjustment of the 12V Adjust Control (R10).

If the -5.0V is missing, check Resistor (R19), Zener Diode CR2 and check for possible short to ground.

MICROPROCESSOR (CPU) OPERATION

Check the 1.774MHz clock waveform at pin 6 of Microprocessor IC (Z40). If the waveform is missing or off frequency, refer to the "CPU Clock and Divider" section of this Troubleshooting guide.

If the waveform is normal, check the operation of the reset signal at pin 26 of IC Z40. The logic reading at pin 26 should be Low for approximately .1 second when the Computer is turned On and then change to and remain High. If the logic reading is incorrect, check Capacitor C42, Resistor R47 and check ICs Z52 and Z53 by substitution.

If the logic reading at pin 25 of IC Z40 is Low, the data lines (pins 7 thru 10 and 12 thru 15 of IC Z40) and address lines (pins 1 thru 5 and 30 thru 40 of IC Z40) will be disabled. When disabled the logic readings for the data lines are High and the address lines are Open (No lights On). The logic readings at the inputs and outputs of the address line buffers, Tri-State Buffer ICs (Z22, Z38, Z39 and Z55), will also read Open (No lights On). If the logic reading at pin 25 of IC Z40 is Low, check Resistor R58 and check for a possible short to ground. The data and address lines from IC Z40 can be checked by grounding pin 25 of IC Z40 and checking the logic readings for High on the data lines and for Open (No lights On) on the address lines.

If IC Z40 appears to start operating when the computer is turned On and suddenly stops, pulses appear on data lines then suddenly stop, check ROM A/B IC (Z1B) RAM ICs (Z13 thru Z20) by substitution.

CPU CLOCK AND DIVIDER

Verify that the CPU Clock is operating properly by checking for a frequency of 10.6445MHz at pin 6 of IC Z42. If the clock is off frequency, check 10.6445MHz Crystal (Y1) and Capacitor C43. If the clock is not operating, check Crystal Y1, Capacitor C43, Resistors R46 and R52 and check IC Z42 by substitution.

The 10.6445MHz clock is divided by six by the Divide By 6 IC (Z56) to supply the 1.774MHz clock, pin 8 of IC Z56, and fed to pin 6 of Microprocessor IC (Z40). Check for a frequency of 1.774MHz at pin 8 of IC Z56. If the frequency is incorrect or the signal is missing, check the logic reading at pin 6 of IC Z56 for a Low. If the logic reading at pin 6 is High, check Resistor R67 and check IC Z42 by substitution. If the logic reading at pin 6 is Low, check IC Z56 by substitution. Check for pulses at pin 6 of IC Z40. If pulses are missing, check Resistor R64 and check Tri-State Buffer IC (Z72) by substitution.

VIDEO

No video on the Monitor screen. Check the waveform at the emitter of the Video Output Transistor (Q1). If the waveform is normal, check the Video Connector (J2) for good connection and check the video cable.

If the waveform is missing at the emitter of Transistor Q1, check for a video signal at pin 5 of Driver IC (Z41). If the signal is present at pin 5 of IC Z41, check the voltages and components associated with Transistor Q1. If signal is missing at pin 5 of IC Z41, check for a video signal at pin 6 of IC Z41. If the signal is present, check IC Z41 by substitution. If the signal is missing from pin 6 of IC Z41, check the waveform at pin 3 of IC Z30.

If the waveform is present at pin 3 of IC Z30 and the logic reading at pin 2 of IC Z30 is Low, check IC Z30 by substitution. If the logic reading at pin 2 of IC Z30 is High, check the Shift Reg (Register) IC (Z11) by substitution. If the waveform is missing at pin 3 of IC Z30, check the waveform at pin 15 of Shift Reg (Register) IC (Z10) and check for pulses at pins 4, 5, 10, 11 and 12 of IC Z10. If the waveform and pulses are present, check IC Z10 by substitution.

Video display does not operate in the 32 character mode. Type and run the following Basic program and check for pulses at pins 9 and 14 of Flip/Flop IC (Z59).

```
10 OUT 255,8: OUT 255,0: GOTO 10
```

If pulses are missing at pin 9 of IC Z59, check for pulses at pins 9 and 10 of IC Z25. If pulses are missing from pin 9 of IC Z25, check Tri-State Buffer IC (Z22) and ICs Z23 and Z52 by substitution. If pulses are missing from pin 10 of IC Z25, check ICs Z36, Z52 and Z54 by substitution. If pulses are present at pin 9 and 10 of IC Z25, check IC Z25 by substitution.

If pulses are present at pin 9 of IC Z59 and missing at pin 14 of IC Z59, check IC Z59 by substitution. If pulses are present at pin 14 of IC Z59, check Mux (Multiplexer) IC (Z43) by substitution.

TROUBLESHOOTING (Continued)

VIDEO RAM

The following Basic program can be used to check the RAM ICs (Z45 thru Z48 and Z61 thru Z63). The program checks each bit of RAM and displays on the Monitor screen any defective bit found. If a Printer is connected to the Computer, the bad bit message can be sent to the Printer by changing the word PRINT in lines 130 and 150 to the word LPRINT.

VIDEO RAM TEST PROGRAM

```
5 DATA 1, 2, 4, 8, 16, 32, 128
10 Y=6: X=15360: POKE X,64
20 IF (PEEK (X) AND 64)=64 THEN 30 ELSE 150
30 POKE X,160
40 IF (PEEK (X) AND 64)=0 THEN 50 ELSE 150
50 FOR X=15360 TO 16383
60 FOR Y=0 TO 6
70 READ Z: POKE X,Z
80 IF (PEEK (X) AND Z)=Z THEN 90 ELSE 140
90 POKE X,0
100 IF (PEEK (X) AND Z)=0 THEN 110 ELSE 140
110 NEXT Y
120 RESTORE : NEXT X
130 PRINT "MEMORY GOOD" : END
140 IF Y=6 THEN Y=7
150 PRINT "BIT"; Y; "OF MEMORY LOCATION"; X;
    "CHECKS BAD"
160 IF Y=6 THEN 50 ELSE 110
```

The bit number that each RAM IC produces is noted on the schematic. If the program finds a bad bit, check the schematic for the RAM IC that produces that bit and check that RAM IC by substitution.

NOTE: No RAM IC is used for bit 6. Bit 6 is produced by comparing bits 5 and 7 with a NOR Gate IC Z30. If the program indicates bit 6 is bad and bits 5 and 7 are good, check IC Z30 by substitution.

Tri-State Buffer ICs (Z44 and Z60) are used to connect the RAM IC outputs to the data lines. If a bad bit is found and the RAM IC checks good, check the Tri-State Buffer associated with the defective bit by substitution.

VIDEO SYNC

No vertical sync. Check the waveform at pin 11 of Counter IC (Z32). If the waveform is missing, check IC Z32 by substitution. If the waveform is present, check the waveform at pin 8 of IC Z57. If the waveform is missing at pin 8, check the Vertical Center Control (R21), Capacitors C26 and C27 and check IC Z57 by substitution. If the waveform is present at pin 8, check IC Z5 by substitution.

No horizontal sync. Check the waveform at pin 11 of Counter IC (Z50). If the waveform is missing, check IC Z50 by substitution. If the waveform is present, check the waveform at pin 8 of IC Z6. If the waveform is missing at pin 8, check the Horizontal Center Control (R20), Capacitors C20 and C21 and check IC Z6 by substitution. If the waveform is present at pin 8 of IC Z6, check IC Z5 by substitution.

No vertical or horizontal sync. Check the waveforms at pin 8 of IC Z5. If the waveforms are missing, check IC Z5 by substitution. If the waveforms are present, check Resistors R28 and R29 and Sync Amp Transistor (Q2).

KEYBOARD

Keyboard is not functioning. Check the ribbon cable between Keyboard and CPU Board for open circuits. If the ribbon cable checks good, check for pulses at pin 11 of IC Z36. If pulses are missing, check IC Z36 by substitution.

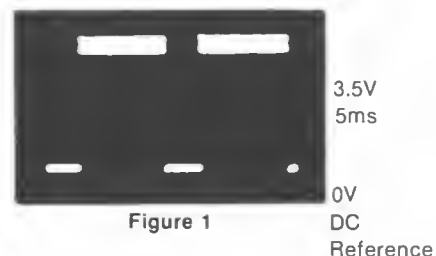
If a group of keys are not functioning, check the pins of ICs Z1A and Z2A and Tri-State Inverter ICs (Z3A and Z4A) connected to the keys not functioning. Also check the ribbon cable for open circuits.

If a single key does not function, check the key contacts with an ohmmeter. If the key is erratic and intermittent in operation, clean the contacts with a spray contact cleaner.

If a wrong character shows up on the Monitor screen when an alpha or numeric key is pressed, check the video RAM, refer to the "Video RAM" section of this Troubleshooting guide and check Flip/Flop IC (Z28) and Character Generator IC (Z29) by substitution.

CASSETTE

Computer will not save programs onto tape or will not turn On the cassette motor. Type and run the following Basic program. The program will produce the waveform shown in Figure 1 at pin 2 of Flip/Flop IC Z59 and will toggle On and Off Motor Control Relay (K1) on the CPU Board and Relay (K1) on the Expansion Interface Board.



```
10 FOR X=1 TO 100
20 OUT 255,3: OUT 255,0
30 NEXT X
40 OUT 255,4: POKE 14308,0
50 FOR X=1 TO 100
60 OUT 255,7: OUT 255,4
70 NEXT X
80 POKE 14308,1: GOTO 10
```

If the Cassette Motor is not switching On, listen for a clicking sound from Relay K1 on the CPU Board. If the Relay is clicking, check Relay K1 contacts with an ohmmeter and check the connections at pins 1 and 3 of Connector J3. If Relay K1 is not clicking, check the logic reading at pin 1 of Driver IC (Z41). The logic reading should be toggling between Low and High. If the logic reading is correct, check for a logic reading that toggles between Low and High at pin 3 of IC Z41. If the logic reading is incorrect at pin 3 of IC Z41, check IC Z41 by substitution. If the logic reading is correct at pin 3, check Relay K1 and Diode CR3. If the reading at pin 1 of IC Z41 is incorrect, check for pulses at pin 9 of Flip/Flop IC (Z59). If pulses are present at pin 9,

TROUBLESHOOTING (Continued)

check IC Z59 by substitution. If pulses are missing at pin 9, check IC Z25 by substitution.

If the Cassette Motor runs all the time, check for sticking relay contacts and check for possible shorted Zener Diodes CR9 and CR10.

If the Computer will not save programs onto tape, check for the waveform shown in Figure 1 at pin 2 of IC Z59. If the waveform is present, check Resistors R53, R54 and R55 and check pin 5 of Connector J3 for good connection. If the waveform is missing at pin 2 of IC Z59, check for pulses at pin 9 of IC Z59. If pulses are missing, check IC Z25 by substitution. If pulses are present at pin 9 of IC Z59, check IC Z59 by substitution.

If the Computer will not load a program from tape, connect a 2V p-p, 1kHz sinewave audio signal to pin 4 of Connector J3. Type and run the following Basic program.

```
10 X = INT(255)
20 PRINT "X = "; X
30 OUT 255,0: GOTO 10
```

The number X that appears on the Monitor screen should be 255 when the 1kHz signal is injected at pin 4 of Connector J3 and 127 with no signal injected. If the numbers are incorrect, check for pulses at pin 10 of IC Z4. If pulses are missing, check the voltages and components associated with pins 1 thru 14 of IC Z4.

If pulses are present at pin 10 of IC Z4 and the cassette modification Counter IC (Z1C) and IC Z2C has been added, check for pulses at pin 9 of IC Z24. If pulses are missing at pin 9, check Diodes CR200 and CR201, Resistor R200 and check ICs Z1C and Z2C by substitution. If pulses are present at pin 9 of IC Z24, check for pulses at pins 8 and 13 of IC Z24 and pins 9 and 10 of IC Z25. If pulses are missing from pin 9 of IC Z25, check Tri-State Buffer IC (Z22), Microprocessor IC (Z40) and ICs Z23 and Z52 by substitution. If pulses are missing at pin 10 of IC Z25, check ICs Z36, Z52 and Z54 by substitution.

If pulses are present at pins 9 and 10 of IC Z25 and missing at pin 13 of IC Z24, check IC Z25 by substitution. If pulses are present at pin 13 of IC Z24 and missing at pin 8 of IC Z24, check IC Z24 by substitution.

If pulses are present at pin 8 of IC Z24, check for pulses at pin 6 of IC Z25. If pulses are present at pin 6 of IC Z25, check Tri-State Buffer IC (Z44) by substitution. If pulses are missing at pin 6 of IC Z25, check for pulses at pin 4 of IC Z25. If pulses are present at pin 4 of IC Z25, check IC Z25 by substitution. If pulses are missing at pin 4 of IC Z25, check ICs Z22, Z23, Z52 and Z40 by substitution.

If Relay K1 on the Expansion Interface Board is not operating, refer to the "Cassette" section of the Troubleshooting guide in the Expansion Interface Folder CSCS3-A.

SCHEMATIC NOTES

- *— Circuitry not used in some versions
 - Circuitry used in some versions
 - ⊖ See parts list
 - ⊕ Ground
- Item numbers in rectangles appear in the alignment/adjustment instructions.
- Supply voltage maintained as shown at input.
- Voltages measured with digital meter.
- Voltages and Waveforms taken with computer in Power Up mode (Main title screen displayed) unless otherwise noted. Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on "0" reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 9 cm width with DC reference voltage given at the bottom line of each waveform. Time in $\mu\text{sec.}$ per cm, given with p-p reading at the end of each waveform.
- Terminal identification may not be found on unit.
- Resistors are $\frac{1}{2}W$ or less, 10% unless noted.
- Value in () used in some versions.

NOTE: Logic probe readings taken with computer in Power Up mode (Main title screen displayed) unless otherwise noted.

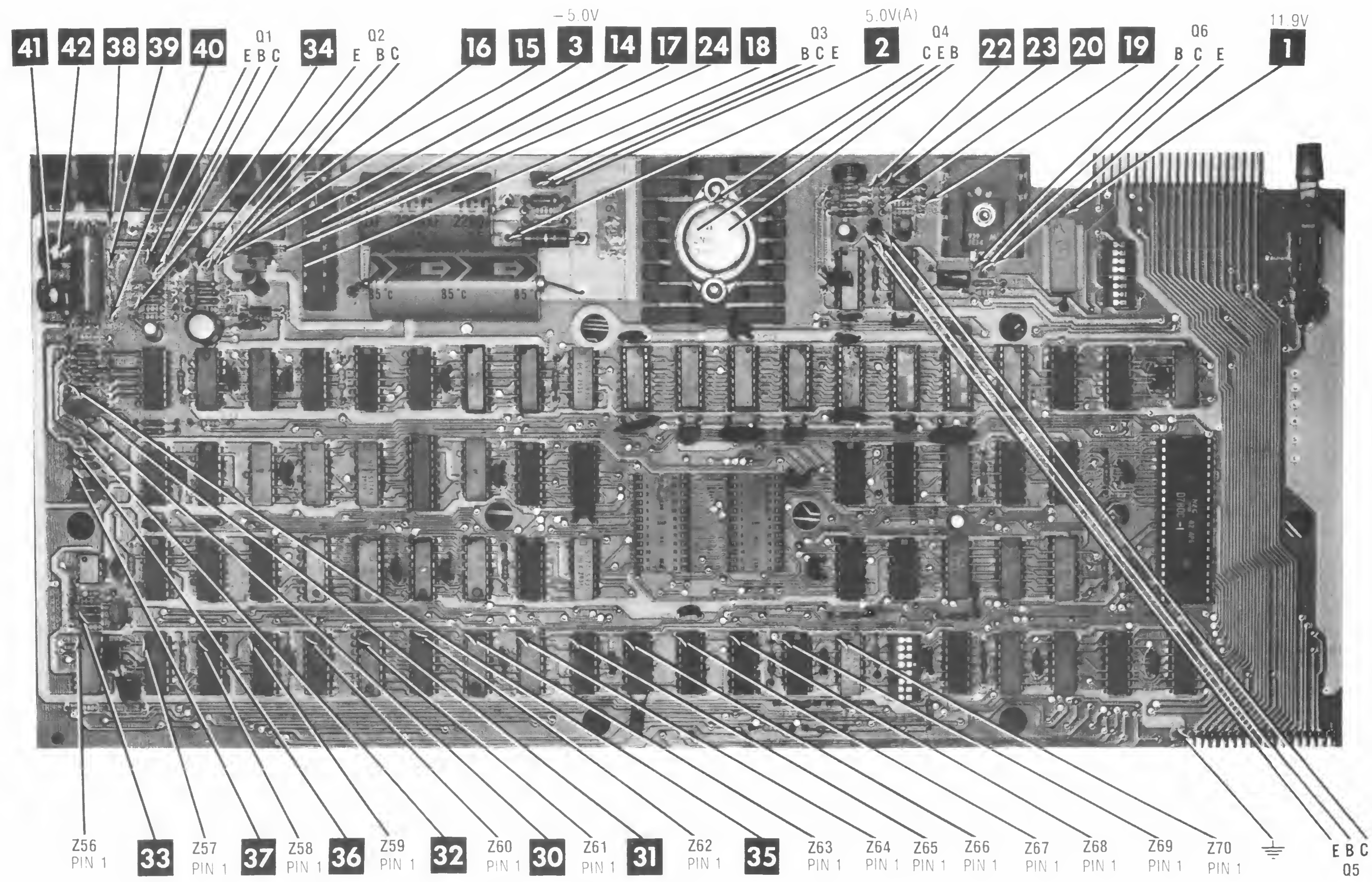
Logic Probe Display

L = Low

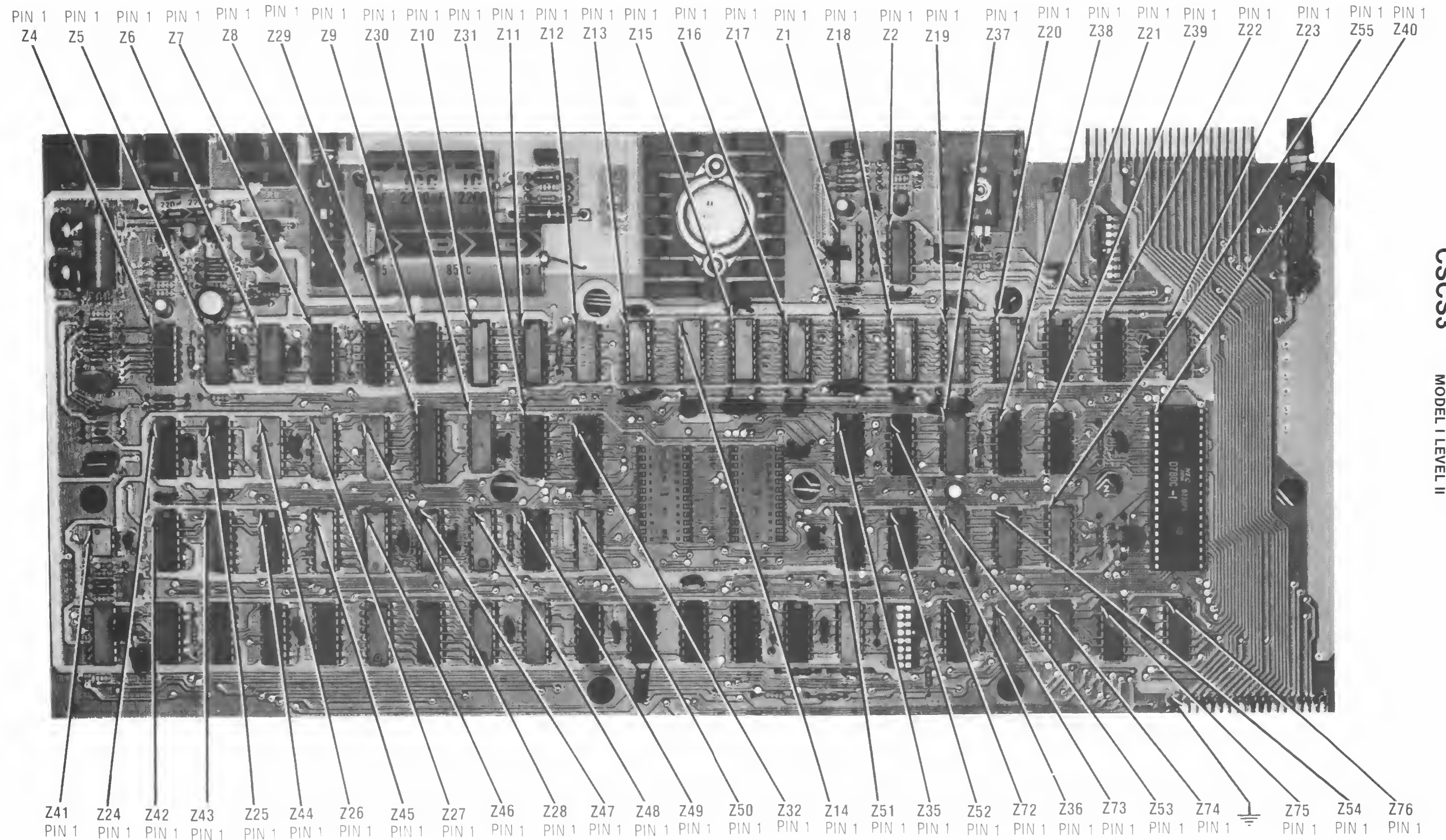
H = High

P = Pulse

* = Open (no light on)

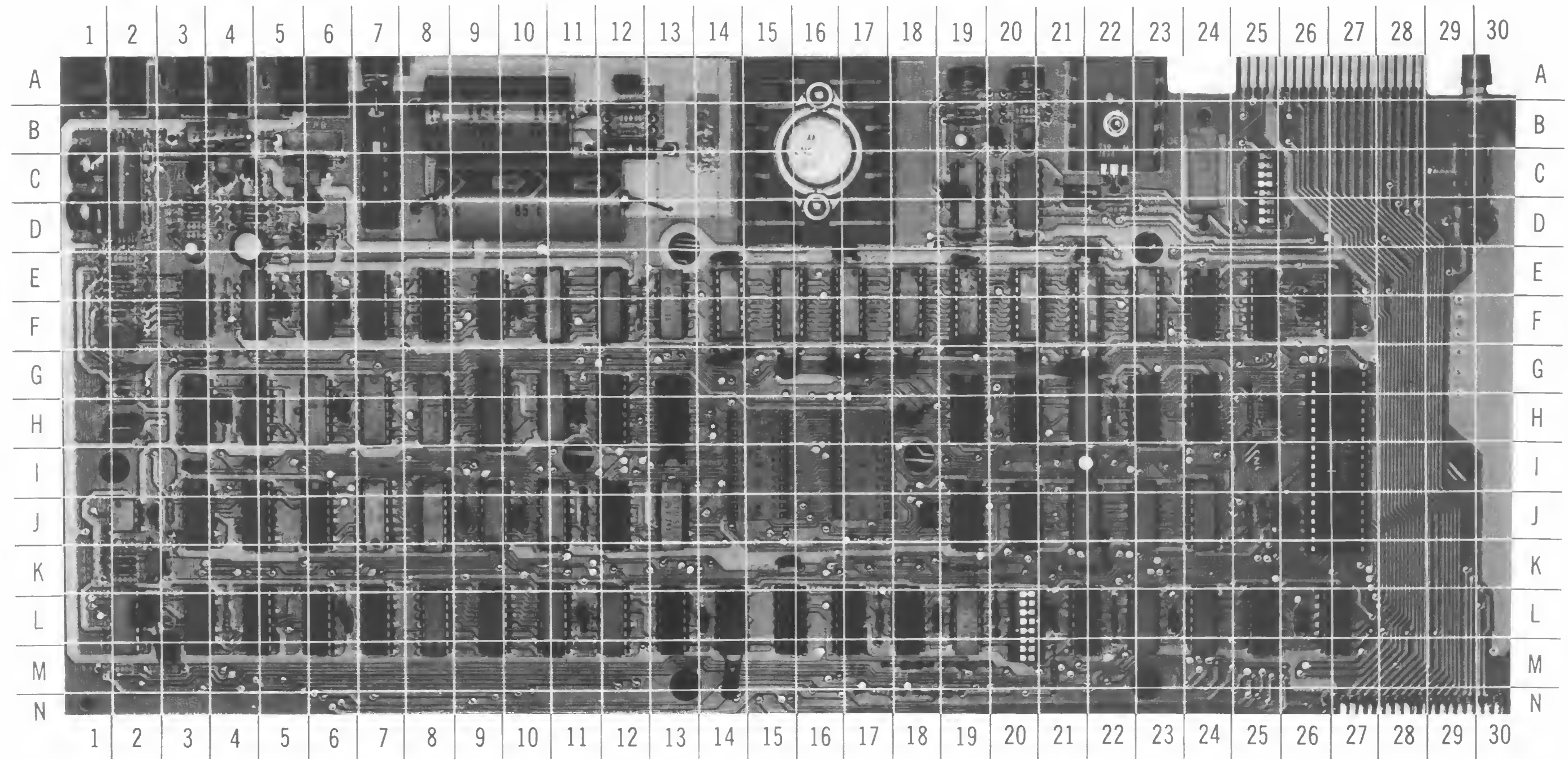


RADIO SHACK TRS-80
MODEL I LEVEL II



CPU BOARD

CPU BOARD



CPU BOARD A Howard W. Sams **GRIDTRACE™** Photo

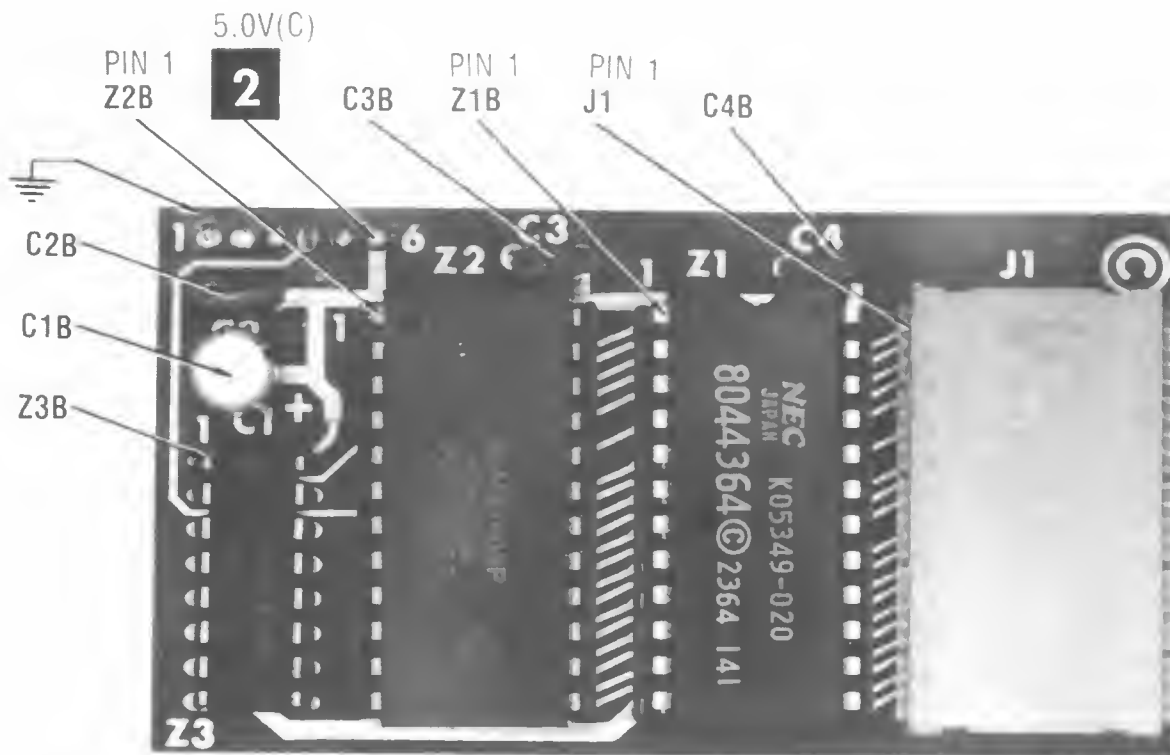
CPU BOARD

CPU BOARD GridTrace LOCATION GUIDE

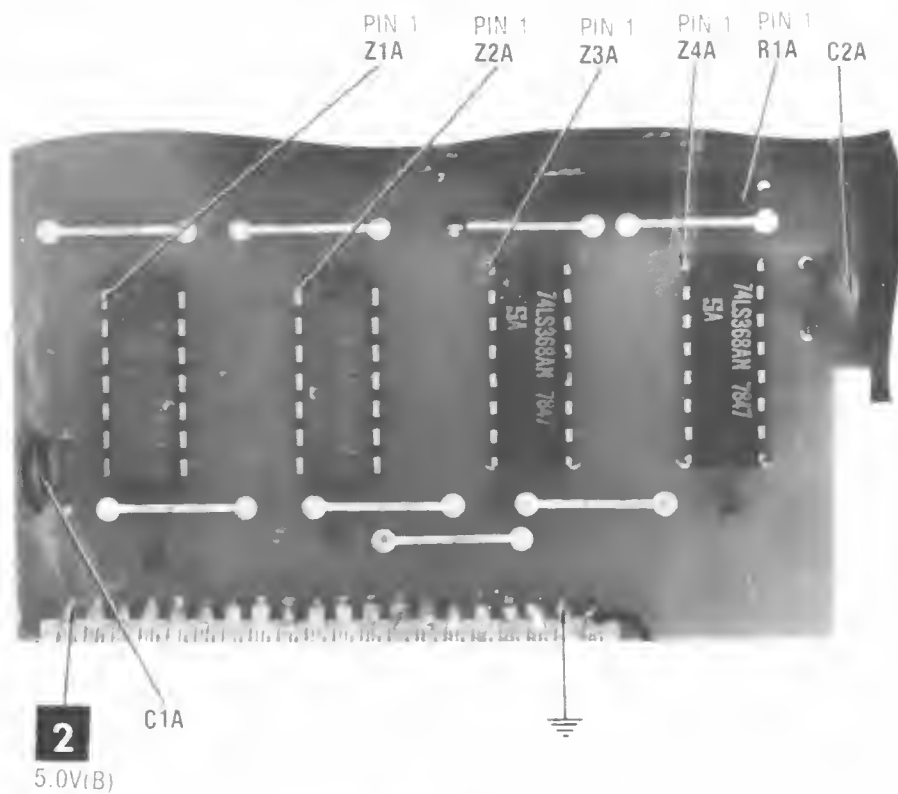
| | | | | | | | |
|------|------|-----|------|------|------|-----|------|
| C1 | B-4 | K1 | C-2 | R67A | D-1 | Z70 | L-19 |
| C2 | C-4 | Q1 | C-3 | R68 | N-18 | Z71 | L-20 |
| C3 | C-6 | Q2 | C-4 | R69 | N-17 | Z72 | L-21 |
| C4 | C-5 | Q3 | A-12 | S1 | B-7 | Z73 | L-23 |
| C5 | D-3 | Q4 | B-16 | S2 | B-29 | Z74 | L-24 |
| C6 | D-4 | Q5 | B-20 | Y1 | H-2 | Z75 | L-25 |
| C7 | D-5 | Q6 | B-22 | Z1 | C-19 | Z76 | L-27 |
| C8 | B-9 | R1 | B-12 | Z2 | C-20 | | |
| C9 | C-9 | R2 | B-12 | Z3 | C-25 | | |
| C10 | B-19 | R3 | B-12 | Z4 | E-3 | | |
| C11 | B-20 | R4 | B-12 | Z5 | E-4 | | |
| C12 | C-19 | R5 | A-19 | Z6 | E-6 | | |
| C13 | C-21 | R6 | A-19 | Z7 | E-7 | | |
| C14 | D-19 | R7 | A-19 | Z8 | E-8 | | |
| C15 | D-20 | R8 | B-19 | Z9 | E-9 | | |
| C16 | E-14 | R9 | B-19 | Z10 | E-11 | | |
| C17 | E-17 | R10 | A-20 | Z11 | E-12 | | |
| C18 | E-19 | R11 | A-20 | Z12 | E-13 | | |
| C19 | E-22 | R12 | A-20 | Z13 | E-14 | | |
| C20 | F-5 | R13 | B-20 | Z14 | E-15 | | |
| C21 | F-6 | R14 | B-20 | Z15 | E-17 | | |
| C22 | F-10 | R15 | C-20 | Z16 | E-18 | | |
| C23 | F-26 | R16 | D-22 | Z17 | E-19 | | |
| C24 | F-2 | R17 | D-22 | Z18 | E-20 | | |
| C25 | G-2 | R18 | C-24 | Z19 | E-21 | | |
| C26 | L-2 | R19 | C-5 | Z20 | E-23 | | |
| C27 | M-3 | R20 | C-1 | Z21 | E-24 | | |
| C28 | G-14 | R21 | D-1 | Z22 | E-25 | | |
| C29 | G-15 | R22 | C-3 | Z23 | E-27 | | |
| C30 | G-17 | R23 | D-3 | Z24 | G-3 | | |
| C31 | G-18 | R24 | D-3 | Z25 | G-4 | | |
| C32 | F-19 | R25 | D-3 | Z26 | G-6 | | |
| C33 | G-20 | R26 | D-3 | Z27 | G-7 | | |
| C34 | G-21 | R27 | D-4 | Z28 | G-8 | | |
| C35 | H-4 | R28 | D-4 | Z29 | G-9 | | |
| C36 | H-6 | R29 | C-4 | Z30 | G-10 | | |
| C37 | H-11 | R30 | D-4 | Z31 | G-12 | | |
| C38 | H-25 | R31 | D-6 | Z32 | G-13 | | |
| C39 | I-3 | R32 | E-2 | Z35 | G-19 | | |
| C40 | I-4 | R33 | E-2 | Z36 | G-20 | | |
| C41 | I-13 | R34 | E-2 | Z37 | G-21 | | |
| C42 | I-21 | R35 | E-2 | Z38 | G-23 | | |
| C43 | J-2 | R36 | F-2 | Z39 | G-24 | | |
| C44 | J-9 | R37 | F-2 | Z40 | G-26 | | |
| C45 | J-10 | R38 | F-4 | Z41 | J-2 | | |
| C46 | J-18 | R40 | F-12 | Z42 | I-3 | | |
| C47 | J-26 | R41 | G-3 | Z43 | I-4 | | |
| C48 | K-2 | R42 | G-3 | Z44 | I-6 | | |
| C49 | K-15 | R43 | G-4 | Z45 | I-7 | | |
| C50 | L-6 | R44 | M-2 | Z46 | I-8 | | |
| C51 | L-11 | R45 | H-2 | Z47 | I-9 | | |
| C52 | L-14 | R46 | H-2 | Z48 | I-11 | | |
| C53 | L-18 | R47 | H-22 | Z49 | I-12 | | |
| C54 | L-21 | R48 | H-25 | Z50 | I-13 | | |
| C55 | L-23 | R49 | J-11 | Z51 | I-19 | | |
| C56 | L-26 | R50 | J-25 | Z52 | I-20 | | |
| C57 | D-29 | R51 | J-26 | Z53 | I-21 | | |
| C58 | H-18 | R52 | J-2 | Z54 | I-23 | | |
| C59 | M-14 | R53 | K-2 | Z55 | I-24 | | |
| C60 | J-22 | R54 | K-2 | Z56 | L-2 | | |
| CR1 | C-9 | R55 | K-2 | Z57 | L-3 | | |
| CR2 | D-6 | R56 | K-2 | Z58 | L-4 | | |
| CR3 | E-2 | R57 | K-19 | Z59 | L-6 | | |
| CR4 | F-2 | R58 | K-22 | Z60 | L-7 | | |
| CR5 | F-2 | R59 | L-4 | Z61 | L-8 | | |
| CR6 | G-2 | R60 | L-17 | Z62 | L-9 | | |
| CR7 | G-2 | R61 | M-18 | Z63 | L-11 | | |
| CR8 | B-6 | R62 | M-19 | Z64 | L-12 | | |
| CR9 | C-2 | R63 | L-20 | Z65 | L-13 | | |
| CR10 | D-2 | R64 | L-22 | Z66 | L-14 | | |
| J1A | A-6 | R65 | D-29 | Z67 | L-15 | | |
| J2 | A-4 | R66 | M-21 | Z68 | L-17 | | |
| J3 | A-1 | R67 | J-3 | Z69 | L-18 | | |

CSCS3

RADIO SHACK TRS-80
MODEL I LEVEL II



LEVEL II ROM BOARD A Howard W. Sams **CIRCUITRACE** Photo



PARTIAL KEYBOARD A Howard W. Sams **CIRCUITRACE** Photo

PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

| ITEM No. | TYPE No. | MFR. PART No. | REPLACEMENT DATA | | | | | |
|-------------------------------|------------|---------------|---------------------------|-----------------------|----------------------|-----------------------|------------------|-----------------|
| | | | GENERAL ELECTRIC PART No. | NEW-TONE NTE PART No. | PHILIPS ECG PART No. | RCA PART No. | WORKMAN PART No. | ZENITH PART No. |
| CR1 CR2 CR3 thru CR7 | 1N4735 | 4800021 | GEZD-6.2 | NTE137A | ECG137A | SK6V2/137A | WEP154/137 | 103-Z9008 |
| | .5M5.1ZS3 | | GEZD-5.1 | NTE5010A | ECG5010A | SK5A1/5010A | WEP141/5010 | 103-279-10 |
| | 1N5231 | 4800022 | GEZD-5.1 | NTE5010A | ECG5010A | SK5A1/5010A | WEP141/5010 | 103-279-10 |
| | 1N4148 | 4800002 | GE-514 | NTE519 | ECG519 | SK3100/519 | WEP925/519 | 103-131 |
| CR8 | MDA202 | 4800023 | GE-167 | NTE167 | ECG167 | SK3647/167 | WEP1052/167 | 212-Z9001 |
| CR9, 10 | 3N255(1) | | GE-167 | NTE167 | ECG167 | SK3647/167 | WEP1052/167 | 212-Z9001 |
| | 1N982A | | GEZD-75 | NTE5046A | ECG5046A | SK75A/5046A | WEP1452/5046 | |
| CR200, 201 | 1N982 | 4800026 | GEZD-75 | NTE5046A | ECG5046A | SK75A/5046A | WEP1452/5046 | |
| | 1N4148 | 4800002 | GE-514 | NTE519 | ECG519 | SK3100/519 | WEP925/519 | 103-131 |
| Q1 | MPS3904 | | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| Q2 | 2N3904 | 4822001 | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | MPS3906 | 4822003 | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| Q3 | MJE29 | | GE-241 | NTE196 | ECG196 | SK3054/196 | WEP756/196 | 121-987-03 |
| | TIP29 | 4820004 | GE-302 | NTE291 | ECG291 | SK3440/291 | WEP780/291 | 121-Z9047 |
| | TIP29A | | GE-302 | NTE291 | ECG291 | SK3440/291 | WEP780/291 | 121-Z9047 |
| Q4 | 2N6594 | 4824003 | GE-74 | NTE219 | ECG219 | SK3173/219 | WEP760/219 | 121-Z9058 |
| Q5 | MPS3906 | 4822003 | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| Q6 | MJE34 | 4824002 | GE-69A | NTE153 | ECG153 | SK3274/153 | WEP746/153 | 121-988-03 |
| Z1 | MC1723CP | 3100001 | GE1C-260 | NTE923D | ECG923D | SK3165/923D | WEP2331/923D | 121-Z9020 |
| Z1A | SN74LS05N | 3102009 | 74LS05 | NTE74LS05 | ECG74LS05 | SK74LS05 | | HE-443-818 |
| Z1B | 8044364(3) | | | | | | | |
| Z1C | MC14040B | | GE-4040 | NTE4040B | ECG4040B | SK4040B | | HE-443-760 |
| Z2 | MC1723CP | 3100001 | GE1C-260 | NTE923D | ECG923D | SK3165/923D | WEP2331/923D | 221-Z9020 |
| Z2A | SN74LS05N | 3102009 | 74LS05 | NTE74LS05 | ECG74LS05 | SK74LS05 | | HE-443-818 |
| Z2B | 8044732 | | | | | | | |
| Z2C | MC14001B | | GE-4001 | NTE4001B | ECG4001B | SK4001B | WEP2272/4001B | 905-125 |
| Z3A | 74LS368AN | 3102025 | 74LS368A | NTE74LS368 | ECG74LS368 | | | |
| Z3B | SN74LS42N | | 74LS42 | NTE74LS42 | ECG74LS42 | SK74LS42 | | HE-443-807 |
| | MC3401P | | | NTE992 | ECG992 | SK3688/992 | | HE-442-71 |
| Z4 | LM3900 | 3100002 | | NTE992 | ECG992 | SK3688/992 | | HE-442-71 |
| Z4A | 74LS368AN | 3102025 | 74LS368 | NTE74LS368 | ECG74LS368 | | | |
| Z5 | MM74C00N | 3102026 | | NTE74C00 | ECG74C00 | | | 905-233 |
| Z6 | MM74C04N | 3102027 | | NTE74C04 | ECG74C04 | | | 905-260 |
| | CD4069N(1) | | | NTE4069 | ECG4069 | | | HE-443-730 |
| Z7 | SN74LS74AN | 3102015 | 74LS74A | NTE74LS74A | ECG74LS74A | SK4069UB SK74LS74A | WEP4069/4069 | |

CSCS3

**RADIO SHACK TRS-80
MODEL I LEVEL II**

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

| ITEM No. | TYPE No. | MFR. PART No. | REPLACEMENT DATA | | | | | |
|----------|-------------|---------------|---------------------------|-----------------------|----------------------|--------------|------------------|-----------------|
| | | | GENERAL ELECTRIC PART No. | NEW-TONE NTE PART No. | PHILIPS ECG PART No. | RCA PART No. | WORKMAN PART No. | ZENITH PART No. |
| Z8 | SN74LS153N | 3102019 | 74LS153 | NTE74LS153 | ECG74LS153 | SK74LS153 | | HE-443-755 |
| Z9 | SN74LS04N | 3102008 | 74LS04 | NTE74LS04 | ECG74LS04 | SK74LS04 | | HE-443-892 |
| Z10, 11 | SN74LS166N | 3102021 | 74LS166 | | ECG74LS166 | | | |
| Z12 | SN74LS93N | 3102017 | 74LS93 | NTE74LS93 | ECG74LS93 | SK74LS93 | | |
| Z13 thru | MB81 16E | 3108009 | | NTE2117 | ECG2117 | | | HE-443-904 |
| Z20 | | 3108003(2) | | | | | | |
| Z21 | SN74LS156N | 3102028 | | | ECG74LS156 | SK74LS156 | | |
| Z22 | SN74LS367AN | 3102024 | 74LS367A | NTE74LS367 | ECG74LS367 | SK74LS367 | | HE-443-857 |
| Z23 | SN74LS32N | 3102014 | 74LS32 | NTE74LS32 | ECG74LS32 | SK74LS32 | | HE-443-875 |
| Z24 | SN74LS132N | 3102018 | 74LS132 | NTE74LS132 | ECG74LS132 | | | HE-443-879 |
| Z25 | SN74LS32N | 3102014 | 74LS32 | NTE74LS32 | ECG74LS32 | SK74LS32 | | HE-443-875 |
| Z26 | SN74LS20N | 3102011 | 74LS20 | NTE74LS20 | ECG74LS20 | SK74LS20 | | HE-443-798 |
| Z27 | SN74LS175N | 3102023 | 74LS175 | NTE74LS175 | ECG74LS175 | SK74LS175 | | HE-443-752 |
| Z28 | SN74LS174N | 3102022 | 74LS174 | NTE74LS174 | ECG74LS174 | SK74LS174 | | HE-443-879 |
| Z29 | 8046670 | | | | | | | |
| | MCN6670P | 3108001 | | | | | | |
| Z30 | SN74LS02N | 3102007 | 74LS02 | NTE74LS02 | ECG74LS02 | SK74LS02 | | HE-443-779 |
| Z31 | SN74LS157N | 3102020 | 74LS157 | NTE74LS157 | ECG74LS157 | SK74LS157 | | HE-443-799 |
| Z32 | SN74LS93N | 3102017 | 74LS93 | NTE74LS93 | ECG74LS93 | SK74LS93 | | |
| Z35 | SN74LS157N | 3102020 | 74LS157 | NTE74LS157 | ECG74LS157 | SK74LS157 | | HE-443-799 |
| Z36 | SN74LS32N | 3102014 | 74LS32 | NTE74LS32 | ECG74LS32 | SK74LS32 | | HE-443-875 |
| Z37 | SN74LS02N | 3102007 | 74LS02 | NTE74LS02 | ECG74LS02 | SK74LS02 | | HE-443-779 |
| Z38, 39 | SN74LS367AN | 3102024 | 74LS367A | NTE74LS367 | ECG74LS367 | SK74LS367 | | HE-443-857 |
| Z40 | D780C-1 | | | | ECG3880 | SK2880/3880 | | HE-443-881 |
| | Z80 | 3110001 | | NTE75452B | ECG3880 | SK2880/3880 | | HE-443-881 |
| Z41 | MC75452P | 3106002 | | NTE75452B | ECG75452B | | | HE-443-74 |
| | 75452 | | | | ECG75452B | | | HE-443-74 |
| Z42 | SN74LS04N | 3102008 | 74LS04 | NTE74LS04 | ECG74LS04 | SK74LS04 | | HE-443-755 |
| Z43 | SN74LS157N | 3102020 | 74LS157 | NTE74LS157 | ECG74LS157 | SK74LS157 | | HE-443-799 |
| Z44 | SN74LS367AN | 3102024 | 74LS367A | NTE74LS367 | ECG74LS367 | SK74LS367 | | HE-443-857 |
| Z45 thru | 21L02B | | | NTE2102 | ECG2102 | | | |
| Z48 | 2102AN-4L | 3108002 | | NTE2102 | ECG2102 | | | |

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

| ITEM No. | TYPE No. | MFR. PART No. | REPLACEMENT DATA | | | | | |
|----------|-------------|---------------|---------------------------|-----------------------|----------------------|--------------|------------------|-----------------|
| | | | GENERAL ELECTRIC PART No. | NEW-TONE NTE PART No. | PHILIPS ECG PART No. | RCA PART No. | WORKMAN PART No. | ZENITH PART No. |
| Z49 | SN74LS157N | 3102020 | 74LS157 | NTE74LS157 | ECG74LS157 | SK74LS157 | | HE-443-799 |
| Z50 | SN74LS93N | 3102017 | 74LS93 | NTE74LS93 | ECG74LS93 | SK74LS93 | | HE-443-799 |
| Z51 | SN74LS157N | 3102020 | 74LS157 | NTE74LS157 | ECG74LS157 | SK74LS157 | | HE-443-755 |
| Z52 | SN74LS04N | 3102008 | 74LS04 | NTE74LS04 | ECG74LS04 | SK74LS04 | | HE-443-879 |
| Z53 | SN74LS132N | 3102018 | 74LS132 | NTE74LS132 | ECG74LS132 | | | |
| Z54 | SN74LS30N | 3102013 | 74LS30 | NTE74LS30 | ECG74LS30 | SK74LS30 | | HE-443-732 |
| Z55 | SN74LS367AN | 3102024 | 74LS367A | NTE74LS367 | ECG74LS367 | SK74LS367 | | HE-443-857 |
| Z56 | SN74LS92N | 3102016 | | | ECG74LS92 | | | |
| Z57 | MM74C04N | 3102027 | | NTE74C04 | ECG74C04 | | | 905-233 |
| | CD4069CN(1) | | | NTE4069 | ECG4069 | SK4069UB | WEP4069/4069 | 905-260 |
| Z58 | SN74LS92N | 3102016 | | | ECG74LS92 | | | |
| Z59 | SN74LS175N | 3102023 | 74LS175 | NTE74LS175 | ECG74LS175 | SK74LS175 | | HE-443-752 |
| Z60 | SN74LS367AN | 3102024 | 74LS367A | NTE74LS367 | ECG74LS367 | SK74LS367 | | HE-443-857 |
| Z61 thru | 21L02B | | | NTE2102 | ECG2102 | | | |
| Z63 | 2102AN-4L | 3108002 | | NTE2102 | ECG2102 | | | |
| Z64 | SN74LS157N | 3102020 | 74LS157 | NTE74LS157 | ECG74LS157 | SK74LS157 | | HE-443-799 |
| Z65 | SN74LS93N | 3102017 | 74LS93 | NTE74LS93 | ECG74LS93 | SK74LS93 | | HE-443-864 |
| Z66 | SN74LS11N | 3102010 | 74LS11 | NTE74LS11 | ECG74LS11 | SK74LS11 | | HE-443-857 |
| Z67, 68 | SN74LS367AN | 3102024 | 74LS367A | NTE74LS367 | ECG74LS367 | SK74LS367 | | HE-443-750 |
| Z69, 70 | SN74LS74AN | 3102015 | 74LS74A | NTE74LS74A | ECG74LS74A | SK74LS74A | | |
| Z72 | SN74LS367AN | 3102024 | 74LS367A | NTE74LS367 | ECG74LS367 | SK74LS367 | | HE-443-857 |
| Z73 | SN74LS32N | 3102014 | 74LS32 | NTE74LS32 | ECG74LS32 | SK74LS32 | | HE-443-875 |
| Z74 | SN74LS00N | 3102006 | 74LS00 | NTE74LS00 | ECG74LS00 | SK74LS00 | | HE-443-728 |
| Z75, 76 | SN74LS367AN | 3102024 | 74LS367A | NTE74LS367 | ECG74LS367 | SK74LS367 | | HE-443-857 |

(1) Number on unit.

(2) Used in 4K versions.

(3) 2ea. 8044732 used in place of 8044364 in early version of Level II.

RADIO SHACK TRS-80
MODEL I LEVEL II

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

CAPACITORS Items not listed are normally available at local distributors.

| ITEM No. | RATING | MFGR. PART No. | ITEM No. | RATING | MFGR. PART No. |
|----------|-----------------|----------------|----------|-----------------|----------------|
| C20 | 330 N470 50V 5% | 1500062 | C25 | 220 N220 50V 5% | 1500061 |
| C24 | 330 50V 10% | | | 220 50V 10% | |
| | 220 N220 50V 5% | 1500061 | | | |
| | 220 50V 10% | | | | |

CONTROLS (All wattages ½ watt, or less, unless listed)

| ITEM NO. | FUNCTION | RESISTANCE | MFGR. PART NO. | NOTES |
|----------|--------------|------------|----------------|-------|
| R5 | 5V Adjust | 1000 | 4750019 | |
| R10 | 10V Adjust | 1000 | 4750019 | |
| R20 | Horiz Center | 100K | 4750018 | |
| R21 | Vert Center | 100K | 4750018 | |

RESISTORS (Power and Special)

| ITEM No. | RATING | REPLACEMENT DATA | | |
|------------|--------------------------------------|------------------|-------------------|------------------|
| | | MFGR. PART No. | NEW-TONE PART No. | WORKMAN PART No. |
| R1A R18 | Resistor Network (1) 5.6 5% 3W WW | 4717003 | | |

(1) Contains nine 4700 10%.

MISCELLANEOUS

| ITEM No. | PART NAME | MFGR. PART No. | NOTES |
|----------------------|--------------|----------------|--|
| CR1A | LED | 2400025 | Power, Red (1.6V @ 8mA) Motor Control |
| K1 | Relay | 4500001 | |
| PT1 | Power Supply | 4000004 | |
| S1 | Switch | 5102008 | Power Reset Key |
| S2 | Switch | 5102009 | |
| SW47 thru SW99 | Switch | | |
| Y1 | Crystal | 2300004 | 10.6445MHz |
| Z1 | Shunt | 2100041 | |
| Z71 | Shunt | 2100041 | |
| | Keyboard | 5100013 | |
| | P.C. Board | 1700069 | CPU Keyboard |
| | P.C. Board | 1700070 | |

CABINET & CABINET PARTS (When ordering specify model, chassis & color)

WIRING DATA

| | |
|---|--|
| Shielded Hook-up Wire | Use BELDEN No. 8401 or 8421 (Single-Conductor) 8208 (Two-Conductor) |
| General-use Unshielded Hook-up Wire | Use BELDEN No. 8529 (Solid) Available in 13 Colors 8522 (Stranded) Available in 13 Colors |

SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the computer system before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
5. Use a grounded-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install boards, floppy disk drives, printers, or other peripherals with computer system AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. Periodically examine the AC power cord for damaged or cracked insulation.
10. The computer system cabinet is equipped with vents to prevent heat build-up. Never block, cover, or obstruct these vents.
11. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
12. Never expose the computer system to water. If exposed to water turn the unit Off. Do not place the computer system near possible water sources.
13. Never leave the computer system unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
14. Do not allow anything to rest on AC power cord.
15. Unplug AC power cord from outlet before cleaning computer system.
16. Never use liquids or aerosols directly on the computer system. Spray on cloth and then apply to the computer system cabinet. Make sure the computer system is disconnected from the AC power line.

RADIO SHACK TRS-80
MODEL I LEVEL II

LINE DEFINITIONS

A0 Thru A15 Address Lines
 BIT 0 Thru BIT 7
 CAS Column Address Strobe
 CHAIN
 CLOCK Clock
 CTR Counter
 D0 Thru D7 Data Lines
 ENABLE Enable
 HALT Halt
 HDRV Horizontal Drive
 HI High
 IN Input
 INT Interrupt
 INTAK Interrupt Acknowledge
 IORQ Input/Output Request
 KR0 Thru KR7 Keyboard Row Lines
 KYBD Keyboard
 L1, L2, L4, L8
 LATCH Latch
 LB0 Thru LB5
 MD0 Thru MD7 Memory Data Lines
 MI
 MODSEL Mode Select

MREQ Memory Request
 MUX Multiplex
 OUT Output
 RAM Random Access Memory
 RAS Row Address Strobe
 RD Read
 ROM Read Only Memory
 ROM B Read Only Memory B
 SHIFT Shift
 SYNC Sync
 SYSRES System Reset
 TEST Test
 VCLR Vertical Clear
 VDRV Vertical Drive
 VID Video
 WAIT Wait
 WR Write
 ZD0 Thru ZD7
 ZIORQ
 ZMREQ
 ZRD
 ZWR

Any Bar above any alphabetical or numerical combination indicates line active in a low (0) state.

MISCELLANEOUS ADJUSTMENTS

12V AND 5V ADJUSTMENT

NOTE: Perform 12V adjustment before 5V adjustment.

Connect the input of a DC voltmeter to pin 3 of Regulator IC (Z2). Adjust the 12.0V Adjust Control (R10) for 11.9V.

Connect the input of a DC voltmeter to pin 3 of Regulator IC (Z1). Adjust the 5V Adjust Control (R5) for 5.0V.

HORIZONTAL AND VERTICAL CENTERING

Type and run the following Basic program to produce a rectangle on the Monitor screen:

```
10 CLS: FOR X=0 TO 127
20 IF X>47 THEN 40
30 SET (0,X): SET (127,X)
40 SET (X,0): SET (X,47)
50 NEXT X
60 GOTO 60
```

Adjust the Horizontal Center Control (R20) and Vertical Center Control (R21) to center the rectangle on the Monitor screen.

ROM SELECT SHUNT (Z3)

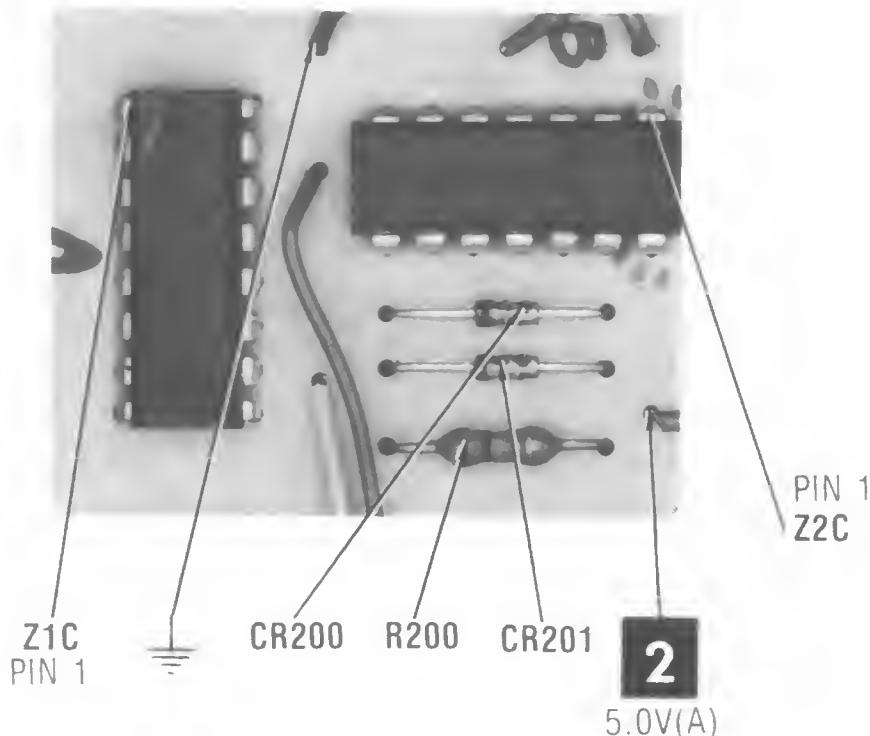
Rom Select Shunt (Z3) is set up in accordance to whether Level I or Level II Basic ROMs are installed. Use the following chart to determine which pins are shunted.

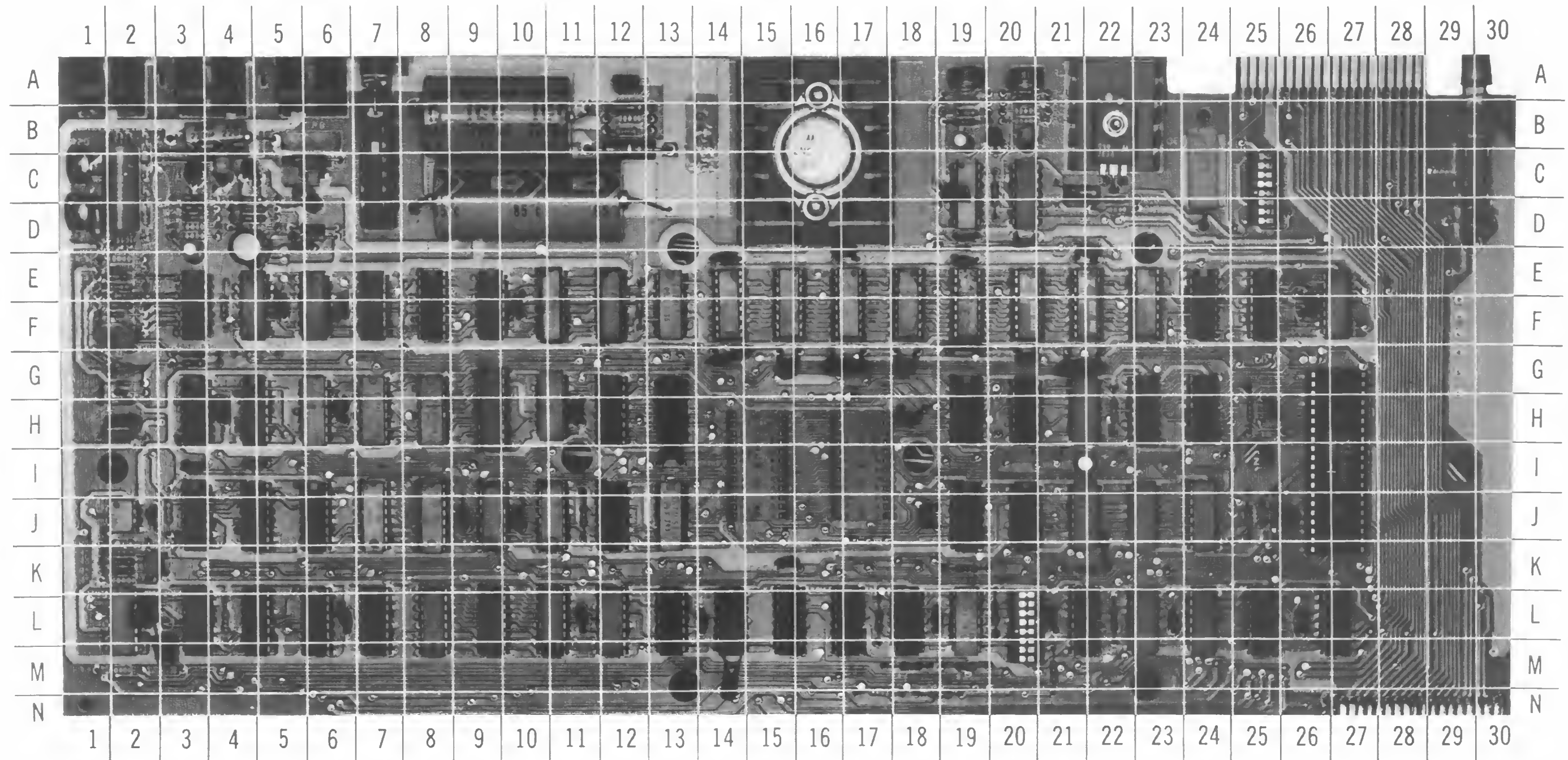
| Z3 PINS | LEVEL I BASIC | LEVEL II BASIC |
|------------|------------------|-------------------|
| 1-16 | Open | Shunted |
| 2-15 | Shunted | Shunted |
| 3-14 | Open | Shunted |
| 4-13 | Shunted | Shunted |
| 5-12 | Open | Shunted |
| 6-11 | Shunted | Shunted |
| 7-10 | Shunted | Shunted |
| 8-9 | Open | Shunted |

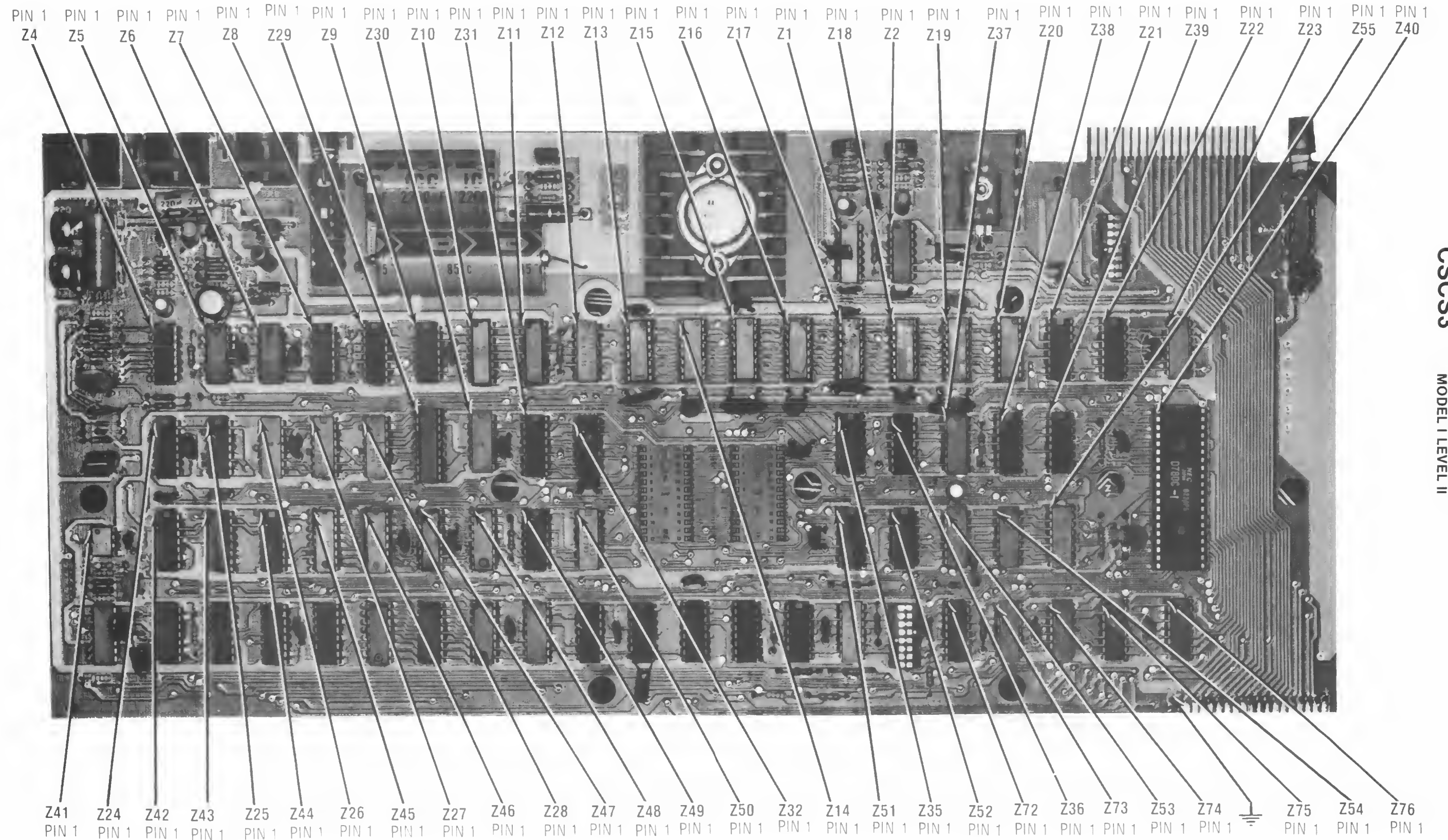
RAM SELECT SHUNT (Z71)

RAM Select Shunt (Z71) is set up in accordance to the amount of RAM memory (4K or 16K) installed on CPU Board. Use the following chart to determine which pins are shunted.

| Z71 PINS | 4K RAM | 16K RAM |
|-------------|-----------|------------|
| 1-16 | Open | Shunted |
| 2-15 | Shunted | Open |
| 3-14 | Open | Shunted |
| 4-13 | Shunted | Open |
| 5-12 | Open | Shunted |
| 6-11 | Shunted | Open |
| 7-10 | Open | Open |
| 8-9 | Open | Open |

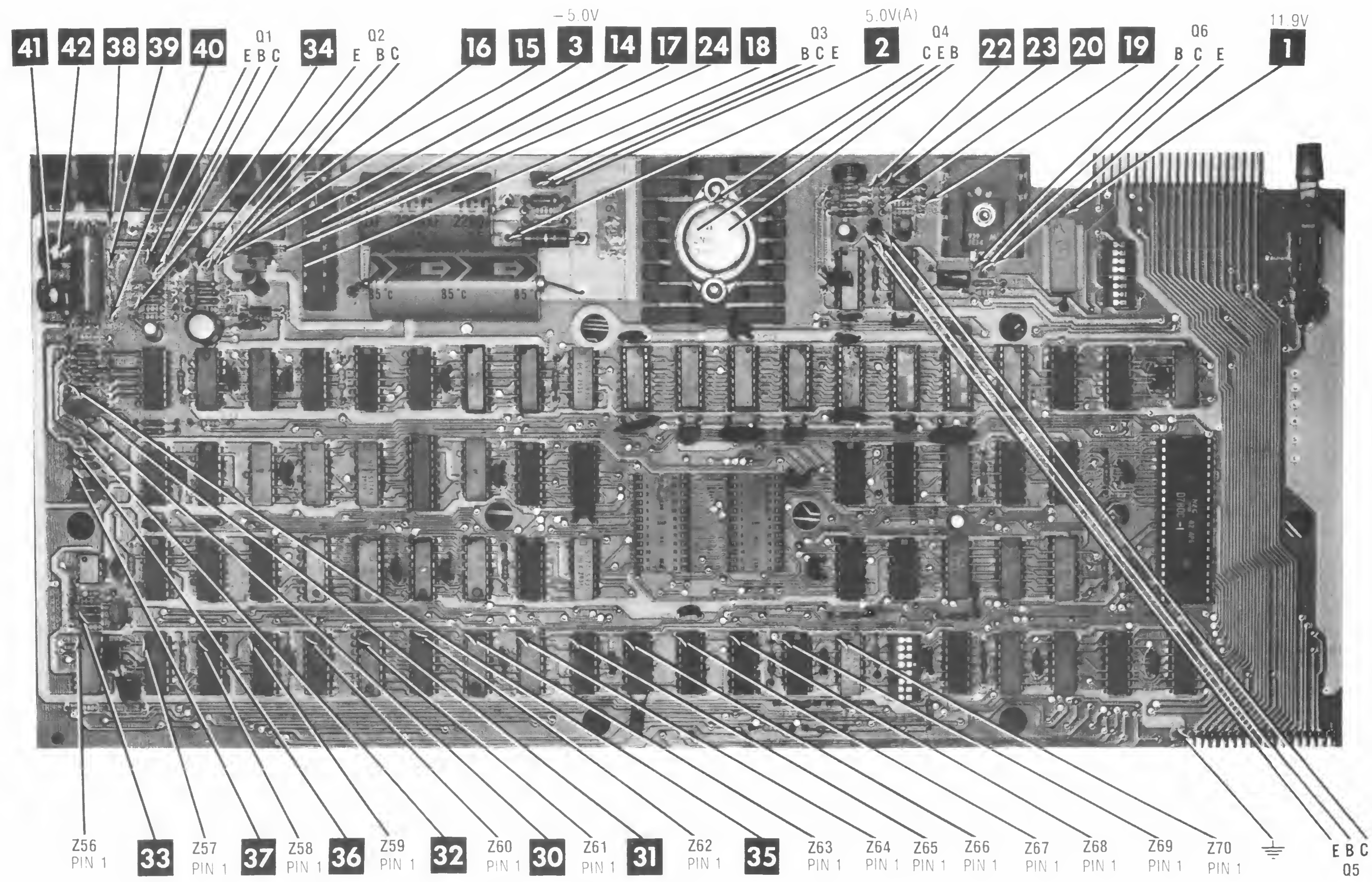






CPU BOARD

CPU BOARD



RADIO SHACK TRS-80
MODEL I LEVEL II

LOGIC CHART

| PIN NO. | IC Z1 | IC Z1A | PIN NO. | IC Z1B | PIN NO. | IC Z1B | PIN NO. | IC Z1C | IC Z2 | IC Z2A | PIN NO. | IC Z2B | PIN NO. | IC Z2B |
|----------------------|------------------|------------------|---------------------|------------------|----------------------|------------------|----------------------|------------------|------------------|------------------|---------------------|------------------|----------------------|------------------|
| 1 2 3 4 | (1) | P L P L | 1 2 3 4 | P P P P | 13 14 15 16 | P P P P | 1 2 3 4 | L L L L | (1) | P L P L | 1 2 3 4 | P P P P | 13 14 15 16 | P P P P |
| 5 6 7 8 | | P L L L | 5 6 7 8 | P P P P | 17 18 19 20 | P P L P | 5 6 7 8 | L L L L | | P L L L | 5 6 7 8 | P P P P | 17 18 19 20 | P P L H |
| 9 10 11 12 | | P L P L | 9 10 11 12 | P P P L | 21 22 23 24 | P P P H | 9 10 11 12 | L P H L | | P L P L | 9 10 11 12 | P P P L | 21 22 23 24 | H P P H |
| 13 14 | | P H | | | | | 13 14 15 16 | L L L H | | P H | | | | |
| PIN NO. | IC Z2C | IC Z3A | IC Z3B | IC Z4 | IC Z4A | IC Z5 | IC Z6 | IC Z7 | IC Z8 | IC Z9 | IC Z10 | IC Z11 | IC Z12 | IC Z13 |
| 1 2 3 4 | H L L H | P H P H | P H H H | L L L P | P H P H | P P P P | P P P P | H L P H | L P P P | L H P P | L L L P | L L L P | P P P P | P P P P |
| 5 6 7 8 | L L L L | P H P L | H H H L | P L L L | P H P L | P P L P | P P L P | L H L H | P P P L | L H L P | P L P L | P L P L | H P P P | P P P H |
| 9 10 11 12 | L H L H | P H P P | H P P P | P H L L | P H P P | P P P P | P P P P | H L L L | P P P P | P H L H | H P P P | H P P P | P L P P | H P P P |
| 13 14 15 16 | L H | P P P H | L L P H | L H | P P P H | P H | P H | L H | P P L H | L H | P L P H | L P H H | P P | P P P L |

Logic probe readings taken with computer turned On, no keys pressed, unless otherwise noted.

Logic Probe Display

L = Low

H = High

P = Pulse

* = Open (No light On)

(1) Logic readings not taken

LOGIC CHART (Continued)

| PIN NO. | IC Z14 | IC Z15 | IC Z16 | IC Z17 | IC Z18 | IC Z19 | IC Z20 | IC Z21 | IC Z22 | IC Z23 | IC Z24 | IC Z25 | IC Z26 | IC Z27 |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|---------|--------|
| 1 | P | P | P | P | P | P | P | P | P | P | P | L | P | H |
| 2 | P | P | P | P | P | P | P | P | H | H | P | L | P | H |
| 3 | P | P | P | P | P | P | P | P | H | H | P | L | P | L |
| 4 | P | P | P | P | P | P | P | P | P | P | L | H | L | H |
| 5 | P | P | P | P | P | P | P | H | P | P | L | H | P | P |
| 6 | P | P | P | P | P | P | P | H | P | P | L | H | P | P |
| 7 | P | P | P | P | P | P | P | H | P | L | L | L | L | P |
| 8 | H | H | H | H | H | H | H | L | L | H | L | H | P | L |
| 9 | H | H | H | H | H | H | H | P | H | P | H | H | P | P |
| 10 | P | P | P | P | P | P | P | P | H | P | H | H | P | P |
| 11 | P | P | P | P | P | P | P | P | P | P | H | L | P | P |
| 12 | P | P | P | P | P | P | P | P | P | P | L | L | P | P |
| 13 | P | P | P | P | P | P | P | P | P | P | H | L | P | P |
| 14 | P | P | P | P | P | P | P | P | P | H | H | H | H | P |
| 15 | P | P | P | P | P | P | P | P | P | L | L | L | L | P |
| 16 | L | L | L | L | L | L | L | H | H | L | L | L | L | H |
| PIN NO. | IC Z28 | IC Z29 | IC Z30 | IC Z31 | IC Z32 | IC Z35 | IC Z36 | IC Z37 | IC Z38 | IC Z39 | PIN NO. | IC Z40 | PIN NO. | IC Z40 |
| 1 | H | P | P | H | P | P | P | H | L | L | 1 | P | 21 | P |
| 2 | P | P | L | P | P | P | H | L | L | P | 2 | P | 22 | P |
| 3 | P | P | P | P | P | P | H | L | L | P | 3 | P | 23 | H |
| 4 | P | P | H | P | * | P | P | L | L | P | 4 | P | 24 | H |
| 5 | P | P | L | P | H | P | P | P | P | P | 5 | L | 25 | H |
| 6 | P | P | L | P | * | P | P | P | P | P | 6 | P | 26 | H |
| 7 | P | P | L | P | * | P | P | L | P | P | 7 | P | 27 | P |
| 8 | L | P | P | L | P | L | H | L | L | L | 8 | P | 28 | P |
| 9 | P | L | P | P | P | P | H | P | L | P | 9 | P | 29 | L |
| 10 | P | P | P | P | P | P | P | L | L | P | 10 | P | 30 | P |
| 11 | P | P | P | P | P | P | P | L | L | P | 11 | H | 31 | P |
| 12 | P | P | P | P | P | P | P | L | L | P | 12 | P | 32 | P |
| 13 | P | P | H | P | * | P | L | H | P | P | 13 | P | 33 | P |
| 14 | P | P | P | P | P | P | H | H | P | P | 14 | P | 34 | P |
| 15 | P | P | P | P | P | P | L | H | P | L | 15 | P | 35 | P |
| 16 | H | P | P | H | P | H | L | H | P | H | 16 | L | 36 | P |
| 17 | | L | | | | | | | | | 17 | H | 37 | P |
| 18 | | H | | | | | | | | | 18 | H | 38 | P |
| | | | | | | | | | | | 19 | P | 39 | P |
| | | | | | | | | | | | 20 | H | 40 | L |

RADIO SHACK TRS-80
MODEL I LEVEL II

Logic probe readings taken with computer turned On, no keys pressed, unless otherwise noted.

Logic Probe Display
L = Low
H = High
P = Pulse
* = Open (No light On)

LOGIC CHART (Continued)

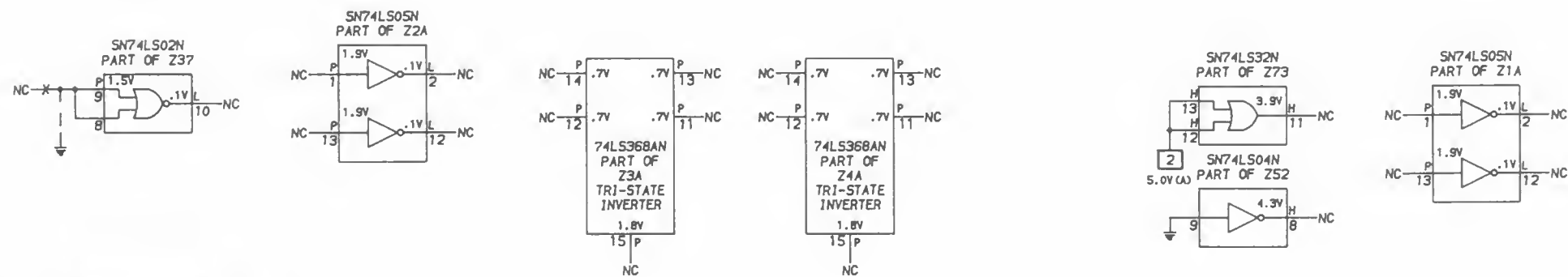
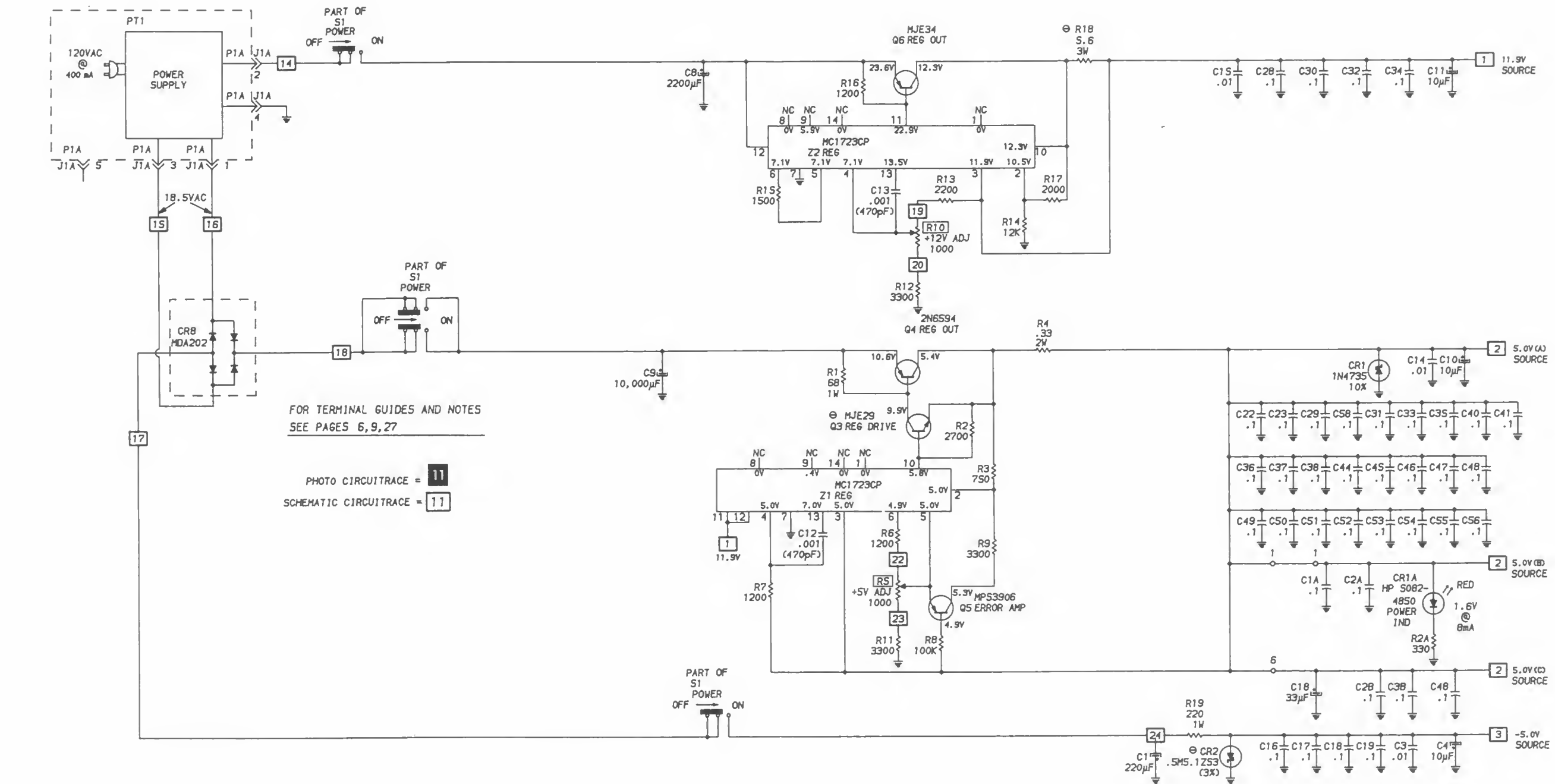
| PIN NO. | IC Z41 | IC Z42 | IC Z43 | IC Z44 | IC Z45 | IC Z46 | IC Z47 | IC Z48 | IC Z49 | IC Z50 | IC Z51 | IC Z52 | IC Z53 | IC Z54 |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | L | P | H | H | P | P | P | P | H | P | P | L | H | P |
| 2 | L | P | P | P | P | P | P | P | P | P | P | H | H | P |
| 3 | H | P | P | P | H | H | H | H | P | P | L | H | L | P |
| 4 | L | P | P | P | P | P | P | P | P | * | L | L | H | P |
| 5 | P | P | L | P | P | P | P | P | P | H | P | P | P | P |
| 6 | P | P | P | P | P | P | P | P | H | * | P | P | P | P |
| 7 | P | L | P | P | P | P | P | P | H | * | P | L | L | L |
| 8 | H | L | L | L | P | P | P | P | L | P | L | H | P | H |
| 9 | | H | P | P | L | L | L | L | P | P | P | L | P | * |
| 10 | | H | P | P | H | L | H | L | P | L | P | H | P | * |
| 11 | | L | P | P | P | P | P | P | P | P | P | L | L | P |
| 12 | | H | P | L | P | P | P | P | H | P | H | P | L | P |
| 13 | | L | P | P | L | L | L | L | H | * | P | P | H | * |
| 14 | | H | P | H | P | P | P | P | L | P | L | H | H | H |
| 15 | | | L | H | P | P | P | P | P | | L | | | |
| 16 | | | H | H | P | P | P | P | H | | H | | | |

| PIN NO. | IC Z55 | IC Z56 | IC Z57 | IC Z58 | IC Z59 | IC Z60 | IC Z61 | IC Z62 | IC Z63 | IC Z64 | IC Z65 | IC Z66 | IC Z67 | IC Z68 |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | P | P | P | P | H | H | P | P | P | H | P | P | P | P |
| 2 | P | * | P | * | L | L | P | P | P | P | L | P | P | P |
| 3 | P | * | P | * | H | P | H | H | H | P | * | P | P | P |
| 4 | P | * | P | * | P | P | P | P | P | P | | P | P | P |
| 5 | P | H | P | H | P | P | P | P | P | P | H | P | P | P |
| 6 | P | L | P | L | H | P | P | P | P | P | * | P | P | P |
| 7 | P | L | P | L | L | L | P | P | P | L | P | L | P | L |
| 8 | L | P | P | P | L | L | P | P | P | | | | | |
| 9 | P | P | P | P | H | P | L | L | L | P | P | P | P | P |
| 10 | P | L | P | L | L | P | H | H | H | P | L | P | P | L |
| 11 | P | P | P | P | P | L | P | P | P | P | P | P | L | L |
| 12 | P | H | P | P | P | L | P | P | L | P | P | P | L | L |
| 13 | P | * | P | * | P | L | L | L | L | P | * | P | P | P |
| 14 | P | H | H | P | H | L | P | P | P | P | | H | P | P |
| 15 | L | | | | L | L | P | P | P | L | | | H | L |
| 16 | H | | | | H | H | P | P | P | H | | | | H |

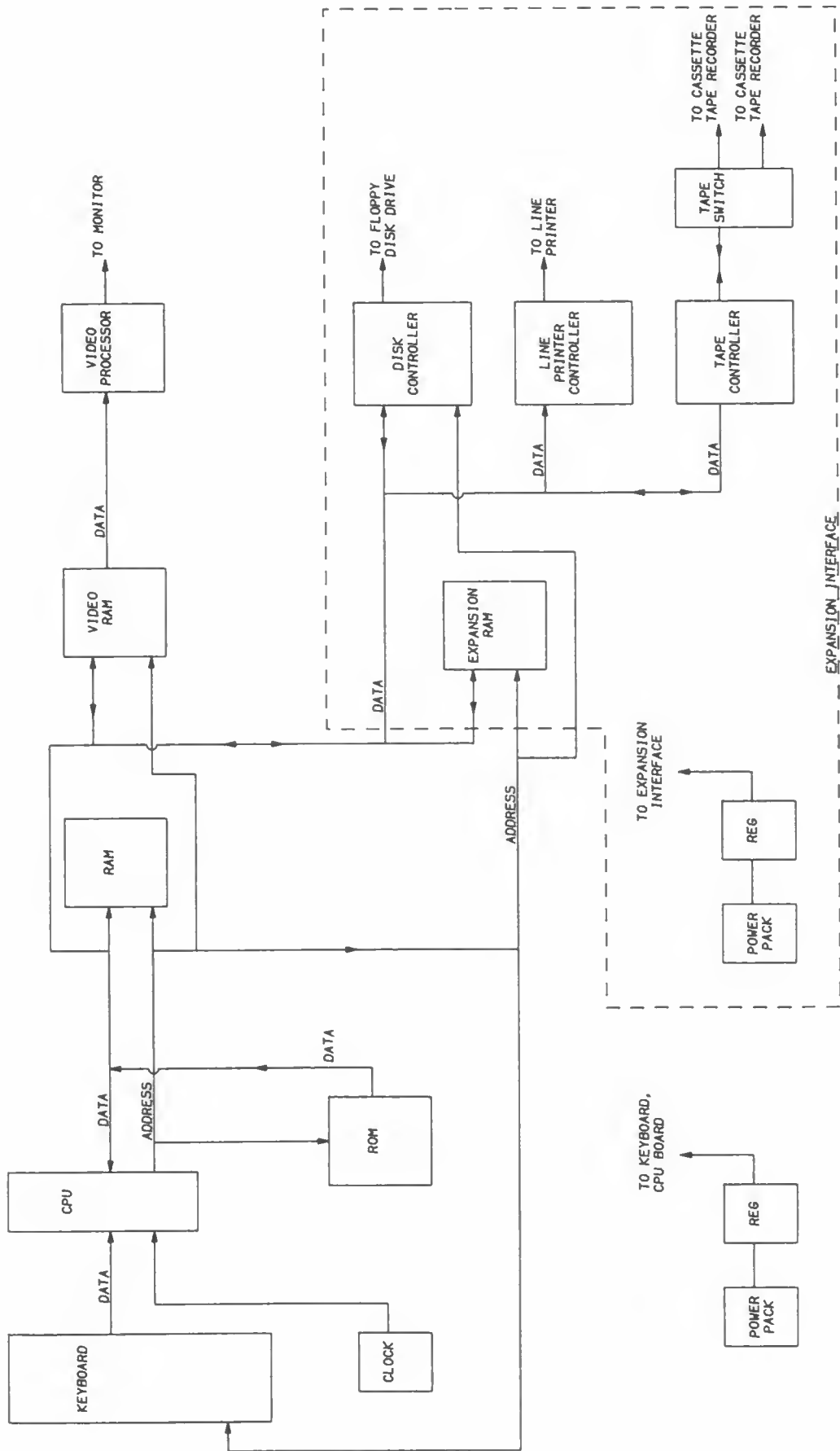
| PIN NO. | IC Z69 | IC Z70 | IC Z72 | IC Z73 | IC Z74 | IC Z75 | IC Z76 |
|---------|--------|--------|--------|--------|--------|--------|--------|
| 1 | P | P | L | H | P | P | P |
| 2 | P | P | P | P | P | P | P |
| 3 | P | P | P | H | P | P | P |
| 4 | H | H | P | L | P | P | P |
| 5 | P | P | P | P | P | P | P |
| 6 | P | P | L | P | P | P | P |
| 7 | L | L | L | L | L | L | L |
| 8 | P | P | L | P | P | P | L |
| 9 | P | P | P | P | P | P | P |
| 10 | H | H | P | P | H | P | P |
| 11 | P | P | P | H | P | P | P |
| 12 | P | P | P | H | P | P | P |
| 13 | P | H | L | H | P | P | P |
| 14 | H | H | L | H | H | P | P |
| 15 | | | L | | | P | P |
| 16 | | | H | | | H | H |

Logic probe readings taken with computer turned On, no keys pressed, unless otherwise noted.

Logic Probe Display
 L = Low
 H = High
 P = Pulse
 * = Open (No light On)



RADIO SHACK TRS-80 MODEL I LEVEL II



BLOCK DIAGRAM

KEYBOARD, CPU BOARD

See Folder CSCS3

SAFETY PRECAUTIONS

See pages, 4, 5.

INDEX

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SAFETY PRECAUTIONS

NOTE: Before servicing this chassis, read and follow these precautions and the "Product Safety Notice".

Before returning any instrument to the customer a safety check of the entire Video Display Monitor should be made. The service technician must be sure that no protective device built into the instrument by the manufacturer has become defective or inadvertently defeated during servicing.

1. Comply with all caution and safety related notes located on or inside the receiver cabinet and on the monitor chassis or picture tube.

2. **WARNING:** Alterations of the design or circuitry of this video display monitor should not be made.

Any design alterations or additions such as, but not limited to, circuit modifications, auxiliary speaker jacks, switches, grounding, active or passive circuitry, etc may alter the safety characteristics of this instrument and potentially create a hazardous situation for the user. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.

3. **HOT CHASSIS WARNING:** The chassis of some video display monitors are connected to one side of the AC supply. "Hot" chassis equipment in which the chassis is solidly connected to one side of the AC line cord may be serviced without using an isolation transformer if the power plug is inserted so that the chassis is connected to the grounded side of the AC supply. Check with an AC voltmeter to see if a potential exists between the chassis and a known earth ground. A zero or very low AC reading should be obtained. If a significant reading is obtained, reverse the power plug and recheck for a zero or low meter reading.

Some chassis have a secondary ground system in addition to the main chassis ground. The secondary ground is **NON-ISOLATED** in respect to the power line. The two ground systems are separated by insulating material which must not be defeated or altered in any way. Other chassis have an 85V RMS potential from chassis to earth ground, regardless of the polarity of the AC supply. Service on these types of chassis should only be performed with an isolation transformer inserted in the power line between the receiver and the AC supply for protection of both personnel and test equipment.

4. Observe the original correct lead dress. Extra precaution should be taken to assure proper lead dress in the following areas: (a) near sharp edges, (b) AC supply area, (c) high voltage area, (d) video input wiring. Insure that wires or components do not touch thermally hot parts. Inspect for pinched, out-of-place, or damaged wiring in all areas.
5. Components that indicate evidence of overheating should be replaced.

6. **WARNING:** The picture tube in this monitor employs integral implosion protection. Replace with a tube of the same type number for continued safety. Do not remove, install or handle the picture tube in any manner unless shatterproof goggles are worn. People not so equipped should be kept away while picture tubes are handled. Keep picture tube away from the body while handling. On "In-Line" type picture tubes, the deflection yoke is an integral part of the picture tube and is permanently attached. Do not attempt to remove "permanently attached" yoke from CRT because of possible tube breakage and hazard to the servicer.

7. Protective shields are provided on this chassis for the protection of both the service technician and the customer. Protective shields removed for servicing convenience must be correctly re-installed and **ANY MISSING SHIELDS MUST BE REPLACED. DO NOT OPERATE THIS INSTRUMENT WITHOUT THE PROTECTIVE SHIELDS IN POSITION AND PROPERLY SECURED.**

8. When replacing a chassis in the cabinet, always be certain that all the protective devices are put back in place, such as: non-metallic control knobs, insulating fish papers, adjustment and compartment covers/shields, isolation resistor capacitor networks, etc.

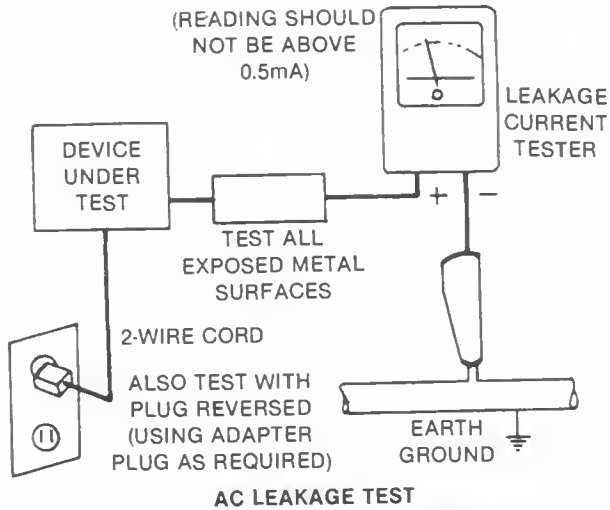
9. **VIDEO INPUT COLD CHECK**

With the AC plug removed from the 120VAC source, place a jumper across the two plug prongs. Turn the instrument AC switch on. Using an ohmmeter, connect one lead to the jumpered AC plug and touch the other lead to each exposed coaxial connector. The resistance measured should not be less than 20 megohms. Any resistance value below this range indicates an abnormality which requires corrective action. Repeat the test with the AC switch in the OFF position.

10. **LEAKAGE CURRENT HOT CHECK (ON COMPLETE ASSEMBLED INSTRUMENT)**

Plug the AC line cord directly into a 120 VAC outlet (do not use an isolation transformer for this check). Use a Leakage Current Tester or a metering system which complies with American National Standards Institute (ANSI C101.1 "Leakage Current for Appliances") and Underwriters Laboratories (UL) 1410, (50.7). Measure for current with the AC switch "on" and repeat with the AC switch "off" from all exposed metal parts of the cabinet (plugs, jacks, handle bracket, metal cabinet, screwheads, metal overlays, control shafts, etc.) to a known earth ground (waterpipe, conduit, etc); particularly any exposed metal part having a return path to the chassis. Any current measured must not exceed 0.5 milliamp. Reverse plug in the AC outlet and repeat test. **ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND CORRECTIVE ACTION MUST BE TAKEN BEFORE RETURNING THE INSTRUMENT TO THE CUSTOMER.**

SAFETY PRECAUTIONS (Continued)



11. X-RADIATION AND HIGH VOLTAGE LIMITS

The primary source of potential x-radiation in solid state video display monitors is the picture tube. The picture tube is specially constructed to prohibit x-radiation emissions. For continued x-radiation protection, the replacement tube must be the same type as the original. The shields and mounting hardware for picture tubes have an x-radiation protection function and must be properly in place.

High voltage must be checked each time any service is required that involves B+, horizontal deflection or high voltage. Where used, x-radiation Protection Circuits (may also be referred to as horizontal disable or

hold-down) must be checked for proper operation each time the x-radiation Protection Circuit is serviced. Refer to the Technician x-radiation warning note on the Chassis Schematic in the Basic Service Data and Instrument Labels for specific high voltage limits of each chassis and, where used, x-radiation Protection Circuits specifications.

High voltage is maintained within specified limits by the use of close tolerance safety related components and adjustments in the high voltage circuit. If high voltage exceeds specified limits, check each component specified on the chassis schematic diagram and take necessary corrective action.

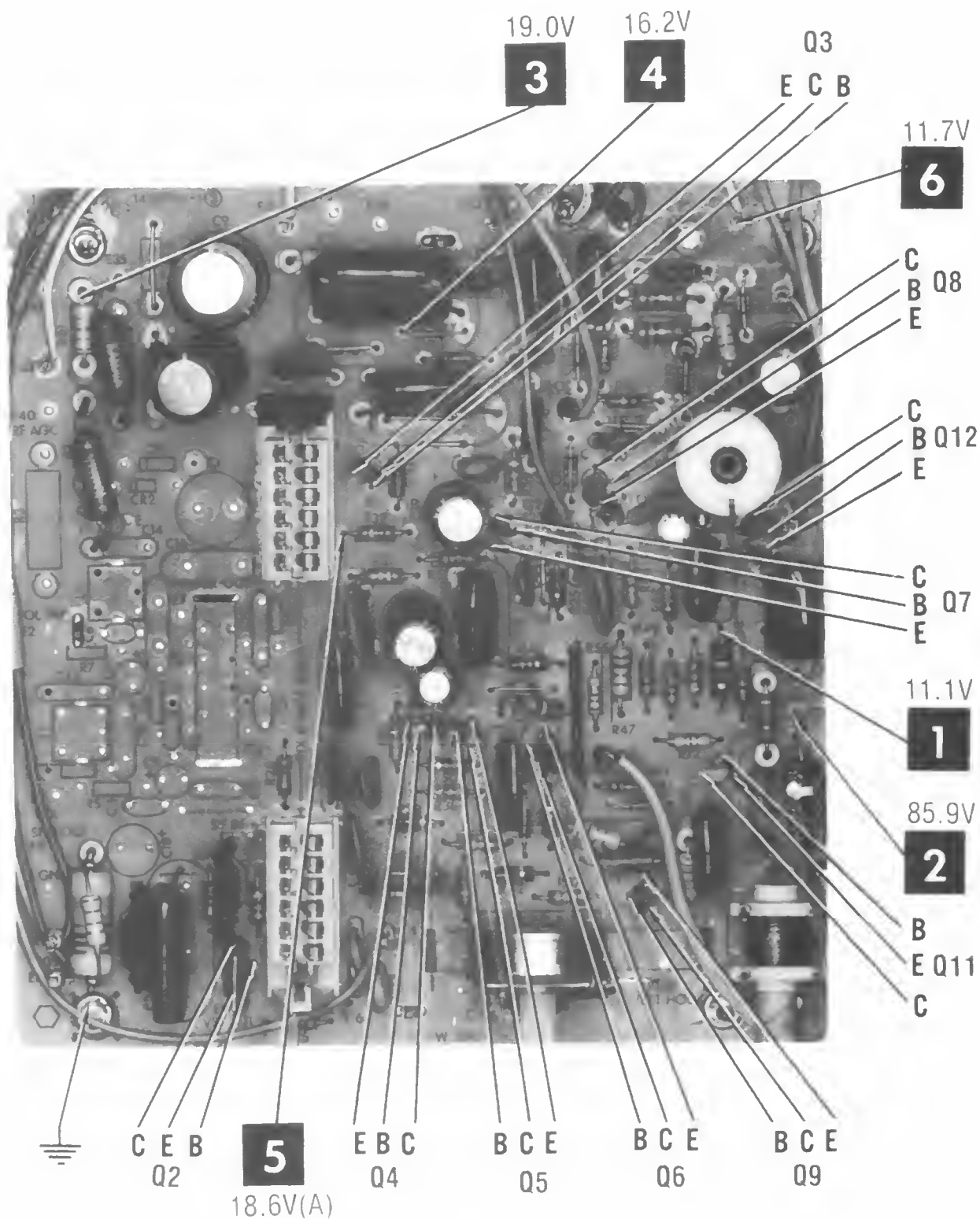
12. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in television sets have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Data and its Supplements and Bulletins. Electrical components having such features are identified by shading on the schematics and by # on the Parts List in this Data and its Supplements and Bulletins. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the Parts List in this Data and its Supplements and Bulletins, may create shock, fire, or other hazards.

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CSCS3-B

RADIO SHACK TRS-80
MODEL I LEVEL II

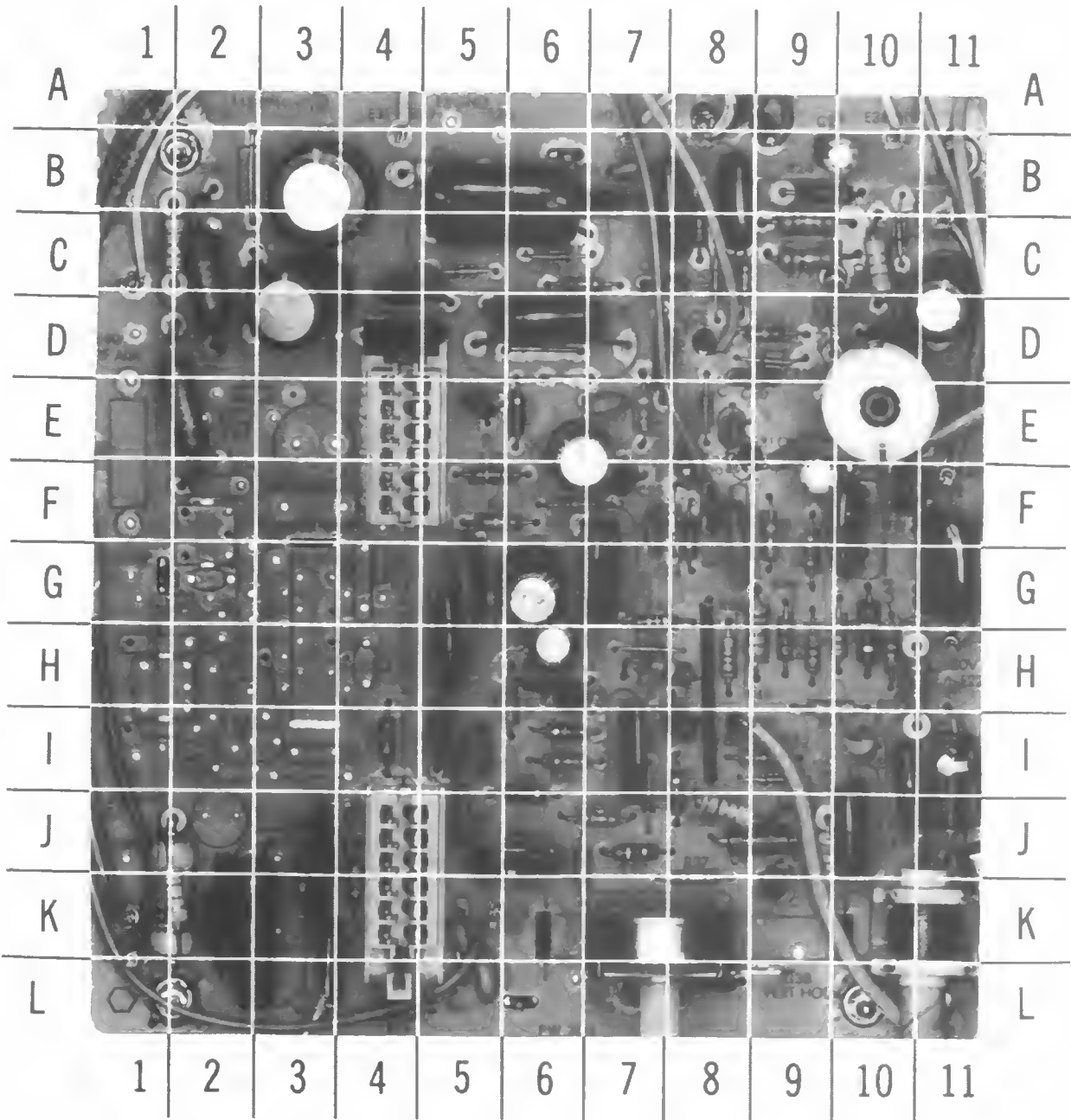


MAIN BOARD

A Howard W. Sams **CIRCUITRACE** Photo

MAIN BOARD GridTrace LOCATION GUIDE

| | | | | | | | | | | | |
|-----|------|-----|-----|-----|------|------|------|------|------|-----|------|
| C9 | B-3 | C34 | G-5 | C49 | E-7 | C65 | J-10 | CR12 | B-7 | L3 | J-3 |
| C10 | D-3 | C35 | I-5 | C50 | D-4 | C66 | I-10 | CR13 | D-6 | L4 | K-11 |
| C22 | K-5 | C38 | I-7 | C51 | D-5 | C68 | F-11 | CR14 | C-5 | L5 | E-10 |
| C23 | L-5 | C39 | E-6 | C56 | J-6 | C69 | E-10 | CR17 | C-8 | Q2 | K-3 |
| C24 | K-3 | C40 | G-6 | C57 | I-5 | C70 | D-11 | CR18 | D-9 | Q3 | E-5 |
| C25 | F-7 | C41 | J-9 | C59 | C-7 | CR4 | F-8 | CR19 | D-9 | Q4 | H-6 |
| C26 | I-11 | C42 | H-6 | C60 | D-8 | CR6 | J-7 | CR20 | C-10 | Q5 | H-6 |
| C27 | B-10 | C43 | G-7 | C61 | B-7 | CR7 | I-9 | FB1 | B-7 | Q6 | I-8 |
| C28 | D-6 | C44 | B-5 | C62 | B-8 | CR8 | H-7 | FB4 | E-10 | Q7 | F-7 |
| C29 | F-8 | C45 | F-8 | C63 | F-9 | CR9 | C-6 | FB5 | F-10 | Q8 | E-8 |
| C33 | H-5 | C48 | B-7 | C64 | F-10 | CR10 | E-8 | FB6 | D-9 | Q9 | K-9 |
| | | | | | | | | FB7 | C-9 | Q11 | I-10 |
| | | | | | | | | L2 | K-2 | Q12 | F-10 |



| | |
|------|------|
| R13B | K-7 |
| R14 | K-1 |
| R15 | L-4 |
| R16 | L-4 |
| R18 | K-4 |
| R19 | K-2 |
| R20 | K-3 |
| R23 | H-10 |
| R24 | B-9 |
| R25 | F-8 |
| R28 | I-4 |
| R29 | G-5 |
| R30 | E-6 |
| R31 | F-5 |
| R32 | F-5 |
| R34 | B-5 |
| R35 | J-7 |
| R36 | I-6 |
| R37 | J-8 |
| R38 | J-6 |
| R39 | I-8 |
| R40 | G-6 |
| R41 | H-6 |
| R42 | J-7 |
| R43 | J-6 |
| R44 | J-6 |
| R45 | H-7 |
| R46 | G-7 |
| R47 | H-9 |
| R48 | F-9 |
| R49 | H-9 |
| R50 | I-6 |
| R51 | F-6 |
| R52 | I-9 |
| R53 | J-8 |
| R54 | J-9 |
| R55 | H-8 |
| R59 | E-7 |
| R60 | D-7 |
| R61 | C-2 |
| R64 | C-6 |
| R65 | C-8 |
| R66 | D-9 |
| R67 | C-8 |
| R68 | G-9 |
| R69 | F-10 |
| R70 | H-9 |
| R71 | H-10 |
| R72 | H-9 |
| R73 | H-10 |
| R74 | J-11 |
| R75 | H-10 |
| R76 | F-11 |
| R77 | D-10 |
| R78 | C-9 |
| R79 | C-9 |
| R80 | C-10 |
| R81 | K-2 |

CSCS3-B

RADIO SHACK TRS-80
MODEL I LEVEL II

PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results)

| ITEM No. | TYPE No. | MFR. PART No. | REPLACEMENT DATA | | | | | |
|--|--------------|---------------|---------------------------|-----------------------|----------------------|--------------|------------------|-----------------|
| | | | GENERAL ELECTRIC PART No. | NEW-TONE NTE PART No. | PHILIPS ECG PART No. | RCA PART No. | WORKMAN PART No. | ZENITH PART No. |
| CR4 CR6 CR7 CR8,9 CR10 CR12 | F084 | 139706 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| | F031 | 119597 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| | F060 | 119597 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| | O31 | 119597 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| | F031 | 119597 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| CR13,14 CR17 CR18 CR19 CR20 CR101 | A-231 | 138173 | GE-511 | NTE552 | ECG552 | SK3130 | WEP172/506 | 103-287 |
| | F084 | 139706 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| | T1031 | 119597 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| | O31 | 119597 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| | A24015 | 119597 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| CR106 CR107 CR108 Q2 | F046 | 139706 | GE-300 | NTE177 | ECG177 | SK9091/177 | WEP1062/177 | 103-131 |
| | RC185-6 | 141489 | GE-510 | NTE125 | ECG125 | SK5010/117A | WEP170/125 | 212-Z9000 |
| | T14881 (3) | 140972 | GE-511 | NTE558 | ECG558 | SK9000/552 | WEP172/506 | 103-287 |
| | M132 | 138173 | GE-511 | NTE552 | ECG552 | SK3130 | WEP172/506 | 103-287 |
| | A82930-6 (1) | (2) | | | | | | |
| Q3 Q4,5 Q6 | 362-3 | 141295 | GE-27 | NTE171 | ECG171 | SK3201/171 | WEP702/171 | 121-822 |
| | 7362-3 | | GE-27 | NTE171 | ECG171 | SK3201/171 | WEP702/171 | 121-822 |
| | 306-8 | 141330 | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | 7306-1 | | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | 112-8 | 132830 | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| Q7 Q8 Q9 | 1112-8 | | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| | 318-2 | | GE-220 | NTE194 | ECG194 | SK3479 | WEP64/194 | 121-881 |
| | 7318-2 | 139268 | GE-220 | NTE194 | ECG194 | SK3479 | WEP64/194 | 121-881 |
| | 666-1 | | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| | 3666-1 | 137155 | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| Q11 Q12 Q101 | 349-2 | 141008 | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | 7349-2 | | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | 303-1 | | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| | 7303-1 | 137340 | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| | 6143H827 | | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| Q101 | 3614-3 | 137875 | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | 306-1 | | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| | 7303-1 | 137340 | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| | M366-1 | | GE-38 | NTE165 | ECG165 | SK3115/165 | WEP740B/165 | 121-1029 |
| | 7366-1 | 140976 | GE-38 | NTE165 | ECG165 | SK3115/165 | WEP740B/165 | 121-1029 |

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results) (cont)

| ITEM No. | TYPE No. | MFR. PART No. | REPLACEMENT DATA | | | | | |
|------------|-------------|---------------|---------------------------|-----------------------|----------------------|--------------|------------------|-----------------|
| | | | GENERAL ELECTRIC PART No. | NEW-TONE NTE PART No. | PHILIPS ECG PART No. | RCA PART No. | WORKMAN PART No. | ZENITH PART No. |
| CR1 | VIDEO BOARD | | GEZD-12 | NTE5021A | ECG5021A | SK12A/5021A | WEP1423/5021 | 103-279-21 |
| Q1 thru Q3 | 1N5242B | 4800037 | GEZD-12 | NTE142A | ECG142A | SK12V/142A | WEP1112/142 | 103-Z9003 |
| Q4 | 1N4742 | 4822001 | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | MPS3904 | 4822003 | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | 2N3904 | 4822003 | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| | MPS3906 | 4822003 | GE-82 | NTE159 | ECG159 | SK3466/159 | WEP62/159 | 121-Z9003 |
| Q5 | MPS3904 | 4822001 | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| Z1 | 2N3904 | 3106001 | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | 6N135 | | | | | | | |
| | HP5082-4351 | | | | | | | |
| | 5082-4350 | | | | | | | |

- (1) Number on unit.
 (2) Part of Horiz Output Transformer T101 Part No. 140995.
 (3) May be part of Q101 in some versions.

WIRING DATA

| | |
|---|--|
| High Voltage Lead | Use BELDEN No. 8869 (17 KV) |
| Shielded Hook-up Wire | Use BELDEN No. 8401 or 8421 (Single-Conductor) |
| General-use Unshielded Hook-up Wire | 8208 (Two-Conductor) |
| | 8529 (Solid) Available in 13 Colors |
| | 8522 (Stranded) Available in 13 Colors |

CSCS3-B

**RADIO SHACK TRS-80
MODEL I LEVEL II**

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

ELECTROLYTIC CAPACITORS

| ITEM No. | RATING | MFGR. PART No. |
|--------------|----------------------|----------------|
| # C113A 8 | 200 175V 250 175V | 140969 |

| ITEM No. | RATING | MFGR. PART No. |
|----------|--------|----------------|
| | | |

Items numbers not listed are normally available at local distributors.
For SAFETY use only equivalent replacement part.

CAPACITORS

| ITEM No. | RATING | MFGR. PART No. |
|----------|--------------|----------------|
| # C101 | .18 200V 10% | 139318 |
| # C102 | 36 N750 5% | 142023 |
| # C103 | .1 200V 10% | 242290 |

| ITEM No. | RATING | MFGR. PART No. |
|----------|-------------|----------------|
| # C105 | .0015 1.2KV | 141496 |
| # C108 | 180 | 143029 |
| # C110 | .1 125VAC | 133343 |

Items numbers not listed are normally available at local distributors.
For SAFETY use only equivalent replacement part.

CONTROLS (All wattages ½ watt, or less, unless listed)

| ITEM NO. | FUNCTION | RESISTANCE | MFGR. PART NO. | NOTES |
|----------|------------|------------|-------------------------|-------|
| # R13B | Vert Hold | 200K | 141022 | |
| R44 | Vert Size | 500K | 1473351-2(1) 138145 | |
| # R102 | Contrast | 500 | 1473359-27(1) 140980 | |
| # R103 | Brightness | 200K | 1472242-43(1) 140711 | |

For SAFETY use only equivalent replacement part.
(1) Number on unit.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

RESISTORS (Power and Special)

| ITEM No. | RATING | REPLACEMENT DATA | | |
|----------|--------------------------|------------------|-------------------|------------------|
| | | MFGR. PART No. | NEW-TONE PART No. | WORKMAN PART No. |
| # R1 | 75 5% 2W Metal Oxide | 832075 | 2W075 | 22-2224 |
| # R2 | 75 5% 2W Metal Oxide | 832075 | 2W075 | |
| # R9 | 10 5% 1/2W Metal Oxide | 830010 | HW010 | |
| R14 | 7500 5% 3W Metal Oxide | | | |
| | 10K 1W | | 1W310 | 22-3120 |
| | 5600 5% 2W | 832256 | 2W256 | 22-4114 |
| # R23 | 470 5% 1/2W Metal Oxide | 830147 | HW147 | 22-2237 |
| # R24 | 4.7 5% 1/2W Metal Oxide | 140986 | HW4D7 | 22-2040 |
| # R34 | 56 5% 1/2W Carbon Film | 830056 | HW056 | 22-2066 |
| R40 | 10K 2% 1/4W Carbon Film | | QW310 | 22-2253 |
| R47 | 12K 2% 1/2W Carbon Film | | HW312 | |
| | 12K 5% 1/2W Carbon Film | 132855 | HW312 | 22-2122 |
| R49 | 120 2% 1/4W Carbon Film | | QW112 | 22-2230 |
| R52 | 150 2% 1/4W Carbon Film | | QW115 | 22-2231 |
| # R54 | 5.6 5% 1/2W Carbon Film | 143031 | HW5D6 | 22-2042 |
| # R61 | 3.3 5% 1/2W Carbon Film | 139324 | HW3D3 | 22-2036 |
| # R77 | 10 5% 1/2W Metal Oxide | 830010 | HW010 | 22-2048 |
| # R80 | 4.7 5% 1/2W Carbon Film | 140986 | HW4D7 | 22-2040 |
| # R108 | 6800 5% 1/2W Carbon Film | 993151-249 | HW268 | 22-2116 |
| # R109 | 6800 5% 1/2W Carbon Film | 993151-249 | HW268 | 22-2116 |
| # R112 | 22 5% 10W WW | 143030 | 10W022 | |
| | | 945312-109(1) | | |
| # R114 | 130 5% 7W WW | 209895 | | |
| | | 945311-128(1) | | |
| # R118 | 2200 5% 10W WW | 249398 | 10W222 | |
| | | 945312-157(1) | | |
| | 2000 10W | | | 24-4093 |
| # R121 | 130 5% 7W WW | 209895 | | |
| | | 945311-128(1) | | |
| | VIDEO BOARD | | | |
| R12 | 200 10% 5W WW | 4717002 | | 24-3070 |

For SAFETY use only equivalent replacement part.
(1) Number on unit.

RADIO SHACK TRS-80
MODEL I LEVEL II

COILS (RF-IF)

| ITEM No. | FUNCTION | MFGR. PART No. |
|----------|----------|----------------|
| L2 | RF Choke | 109946 |

| ITEM No. | FUNCTION | MFGR. PART No. |
|----------|-----------|----------------|
| L3 | Peak 1 ng | 130131 |

COILS & TRANSFORMERS (Sweep Circuits)

| ITEM No. | FUNCTION | REPLACEMENT DATA | | |
|----------|------------------|------------------|----------------------|---------------------|
| | | MFGR. PART No. | OTHER IDENTIFICATION | THORDARSON PART No. |
| # DY1 | Yoke Horiz 4.6mH | | 1463734-504 | |
| | 90° Vert 51mH | 143045 | 1463734-503 | |
| L4 | Horiz Hold | 141017 | | |
| L5 | Horiz Driver | 141021 | | |
| # T101 | Horiz Output | (1) | 1465914-503 | |
| | | 140995(1) | 1465914-501 | |

For SAFETY use only equivalent replacement part.
(1) Includes CR108.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

FUSE DEVICES

| ITEM NO. | DESCRIPTION | MFGR. PART NO. | | NOTES |
|----------|-------------------------------------|----------------|--------|-------|
| | | DEVICE | HOLDER | |
| # F101 | 1A @ 250V Fast-Acting | 426973 | | |
| # F102 | 5A @ 250V Fast-Acting Pigtail | 99328 | | |

For SAFETY use only equivalent replacement part.

MISCELLANEOUS

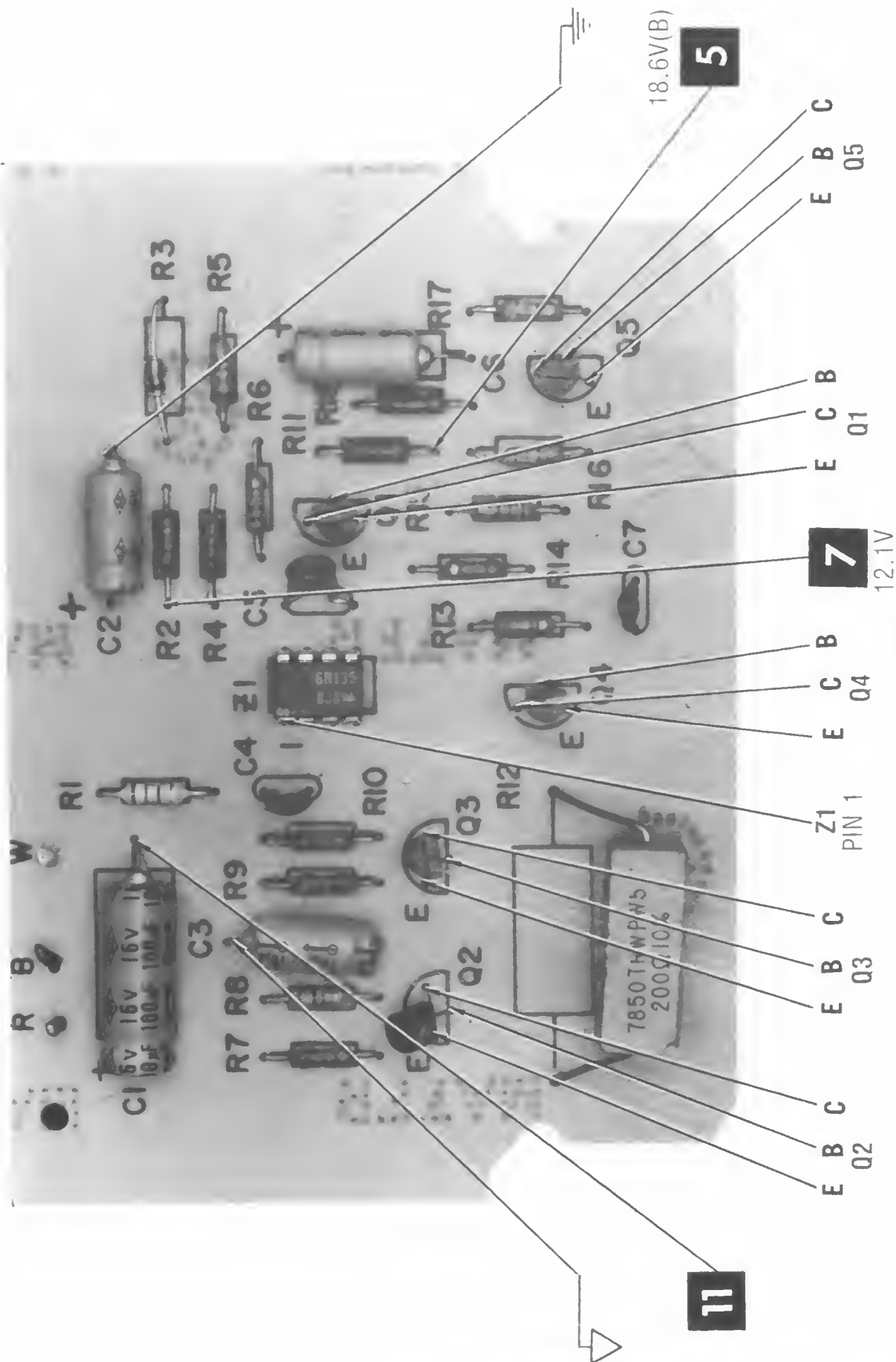
| ITEM No. | PART NAME | MFGR. PART No. | NOTES |
|----------|--------------|----------------|---|
| DS101 | Neon Lamp | 122608 | NE-2H |
| FB1 | Ferrite Bead | 119971 | |
| FB4 | Ferrite Bead | 128456 | |
| FB5 | Ferrite Bead | 128456 | |
| FB6 | Ferrite Bead | 128456 | |
| FB7 | Ferrite Bead | 128456 | |
| FB101 | Ferrite Bead | 138013 | |
| L101 | Ferrite Bead | 143038 | |
| # P101 | Power Cord | 142453 | |
| # S101 | Switch | 142639 | |
| # V101 | CRT | 12VBYP4 | AC, Polarized Power |
| | CRT | 12VBNP4 | |
| | Bracket | 141006 | |
| | Cushion | 132272 | |
| | P.C. Board | 143035 | |
| | P.C. Board | 1700065 | AC Power Cord CRT Mounting Main Video CRT |
| | Socket | 143036 | |

For SAFETY use only equivalent replacement part.

CABINET & CABINET PARTS (When ordering specify model, chassis & color)

| ITEM | PART No. | ITEM | PART No. |
|--------------------|----------|-----------------------------|----------|
| Cabinet Back | 141856 | # Knob-Brightness, Contrast | 136347 |
| Cabinet Front Mask | 142312 | # Knob-Horiz Hold | 124313 |
| Button-Power | 140783 | | |

For SAFETY use only equivalent replacement part.



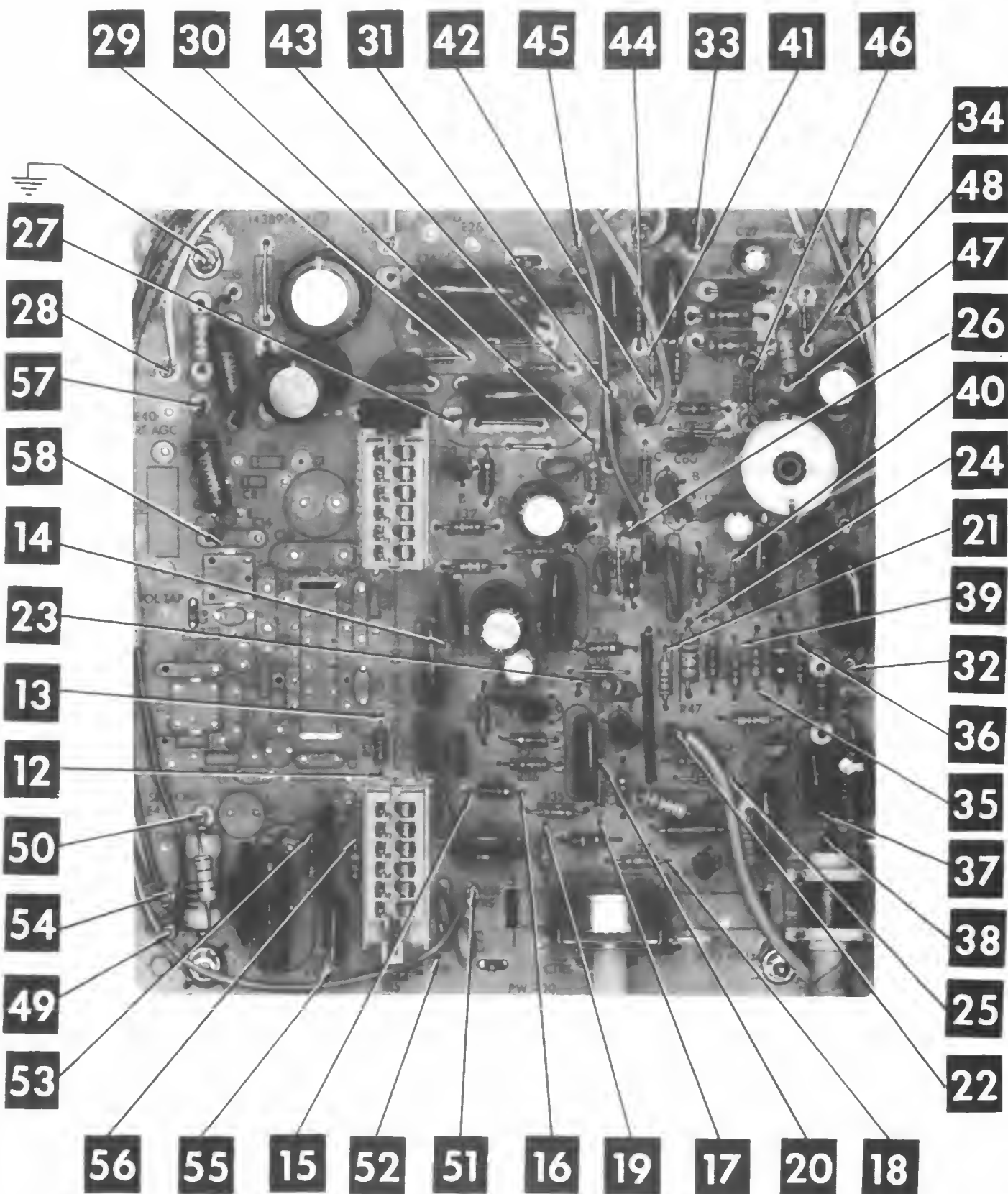
A Howard W. Sams **GRIDTRACE™** Photo

VIDEO BOARD
GridTrace

LOCATION GUIDE

| | | | | | | | | | | | | |
|---|----|---------|----|----|----|----|---|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| A | R | B | W | | | | | | | | | |
| B | C1 | 16V 16V | | | | C2 | | | | | | |
| C | | | C3 | | | R2 | | | | | R3 | |
| D | R7 | R8 | R9 | | C4 | C5 | | | | | | |
| E | | | | | | | | | | | | |
| F | | | | | | | | | | | | |
| G | | Q2 | | Q3 | | | | | | | | |
| H | | | | | | | | | | | | |
| I | | 785010 | | | | Q4 | | C7 | | | | |
| J | | 270010 | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |

| | |
|-----|------|
| C1 | B-3 |
| C2 | B-9 |
| C3 | E-3 |
| C4 | D-5 |
| C5 | E-8 |
| C6 | E-1 |
| C7 | I-8 |
| CR1 | C-1 |
| Q1 | E-9 |
| Q2 | F-2 |
| Q3 | F-4 |
| Q4 | H-7 |
| Q5 | H-11 |
| R1 | C-5 |
| R2 | C-9 |
| R4 | C-9 |
| R5 | B-5 |
| R6 | D-9 |
| R7 | E-2 |
| R8 | E-2 |
| R9 | E-4 |
| R10 | E-5 |
| R11 | F-10 |
| R12 | I-3 |
| R13 | H-8 |
| R14 | G-8 |
| R15 | G-9 |
| R16 | H-10 |
| R17 | H-12 |
| R18 | F-11 |
| Z1 | E-7 |



TROUBLESHOOTING AID

Note: Waveforms taken with triggered scope, Bar-Sweep generator. Schematic voltages measured with digital meter, no signal. Controls adjusted for normal operation.

PICTURE

NO PIC, NO RASTER: Check for AC power supply and sources generated from Horizontal Output Transformer (T101). Refer to "Troubleshooting" Power Supply and Horizontal circuits.

NO PIC, HAS RASTER: Refer to "Troubleshooting" Video circuit.

LOW OR EXCESSIVE BRIGHTNESS: Check Video and Luminance circuits. Refer to "Troubleshooting" Video circuit.

SWEEP

NO RASTER: Check HV rectifier, Part of Horizontal Output Trnasformer (T101). Refer to "Troubleshooting" Horizontal circuit.

NO VERT DEFLECTION: Refer to "Troubleshooting" Vertical circuit.

POOR VERT LIN OR FOLDOVER: Refer to "Troubleshooting" Vertical circuit.

POOR HORIZ LIN OR FOLDOVER: Refer to "Troubleshooting" Horizontal circuit.

NARROW PICTURE: Refer to "Troubleshooting" Horizontal circuit.

VERT OFF FREQUENCY: Refer to "Troubleshooting" Vertical circuit.

HORIZ OFF FREQUENCY: Refer to "Troubleshooting" Horizontal circuit.

SYNC

NO VERT/HORIZ SYNC: Refer to "Troubleshooting" Sync circuit.

Note: Make sure that the problem is in the Monitor and not in the Computer. If the Monochrome Adapter fails, the Monitor will lose raster, or sync, or both, according to whichever signal is missing from the Computer to Monitor.

TROUBLESHOOTING

POWER SUPPLY

Check AC Fuses (F101 and F102) and if open, check Diode CR101, and Capacitor C110. If Fuses F101 and F102 are good, check for 133V at cathode of Diode CR101. If 133V is missing, check Resistor R112 and Power Switch (S101). Check for 88.3V at pin 2 of Horizontal Output Transformer (T101), if missing, check Resistors R121 and R114. Check the voltages developed from Transformer T101. Check for 19.0V at junction of Resistors R9 and R61, 16.2V at junction of Capacitor C44 and Electrolytic C39, 18.6V at junction of Resistors R9 and R32, 11.7V at pin 5 of Transformer T101. If any of the voltages are incorrect, check components associated with that voltage.

HORIZONTAL

Check the Horizontal Output Transistor (Q101). If good, check the waveform at base of Horizontal Oscillator Transistor (Q11). If waveform is missing, check voltages, waveforms and components associated with Transistor Q11. Check waveform at base of Transistor Q101 and if missing, check the voltages, waveforms and components associated with Horizontal Driver Transistor (Q12). If readings at Transistor Q12 are good, check Diodes CR106 and CR108 and

Horizontal Output Transformer (T101). Check the voltages developed by Transformer T101, which may be loading down the horizontal circuit.

For horizontal linearity or foldover problems, check Capacitors C108, C105, C101, C102 and C103 and the Deflection Yoke (DY1).

VERTICAL

Inject a vertical signal at base of Vertical Oscillator Transistor (Q4) and check for vertical deflection on the CRT. If no vertical deflection is noted, inject the vertical signal to the base of Vertical Driver Transistor (Q6). If vertical deflection returns, check voltages and components associated with Transistor Q4 and Preamp Transistor Q5. If vertical deflection does not return, check Transistor Q6, Kine Blanker Transistor (Q7), Vertical Output Transistors (Q8 and Q9), Deflection Yoke (DY1) and associated components.

For poor vertical linearity or foldover problems, check Diodes CR6 thru CR10, Electrolytics C39, C40 and C42 and Capacitors C41 and C45. Refer to the "Resistance Measurements Chart" and check for possible changes in feedback and bias circuitry resistances.

TROUBLESHOOTING (Continued)

VIDEO

Inject a video signal to base of Video Amp Transistor (Q4) on the Video Board. Check waveform at base of Video Output Transistor (Q2) on the Main Board. If waveform is missing, check voltages, waveforms and components associated with Video Amp Transistors (Q1 and Q4 and pins 5 thru 8 of Isolation IC (Z1) on the Video Board. If the waveform is present at base of Transistor Q2 on Main Board, check Transistor Q2, the CRT and components associated with the cathode of the CRT.

No video with Computer connected to Connector P2. Check for 5.0V at pin 2 of IC Z1. This voltage is supplied by the Computer and if missing, check Computer. Check the Video Board by substitution or check Noise Filter Transistor (Q2), Video Preamp Transistor (Q3) and IC Z1 and associated components on the Video Board.

SYNC

No vertical or horizontal sync. Check voltages and waveforms at base and collector of Sync Separator Transistor (Q3).

No vertical sync. Check waveform at base of Vertical Oscillator (Q4). Check Vertical Hold Control (R13B) and associated components.

No horizontal sync. Check waveforms at Diodes CR17 and CR18. Check the Horizontal Hold Coil (L4) and associated circuitry.

RESISTANCE MEASUREMENTS

| MEASUREMENTS TAKEN WITH LOW POWER OHMS METER | | | | | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|----------|-------|-------------|----------|--------|--------|--------|
| ITEM | PIN 1 | PIN 2 | PIN 3 | PIN 4 | PIN 5 | PIN 6 | PIN 7 | PIN 8 | PIN 9 | PIN 10 | PIN 11 | PIN 12 | PIN 13 | PIN 14 |
| V101 | INF | 730K | FIL | FIL | INF | INF | 0 | | | | | | | |
| VIDEO BOARD | | | | | | | | | | | | | | |
| Z1 | INF | INF | 500K | INF | 0 | 47K | 12K | 630 | | | | | | |
| ITEM | E | B | C | | ITEM | E | B | C | | ITEM | E | B | C | |
| Q2 | 200 | 516 | 1.5M | | Q8 | 1.6M | 325K | INF | | VIDEO BOARD | | | | |
| Q3 | 0 | 330K | 3959 | | Q9 | 1.6M | 316K | 5 | | Q1 | 182 | 47K | 2109 | |
| Q4 | 6000 | 870K | 1M | | Q11 | 57 | INF | 550K (1) | | Q2 | INF | INF | INF | |
| Q5 | 550K | 1M | 114K | | Q12 | INF | 3021 | 7 | | Q3 | 800K (1) | INF | 580K | |
| Q6 | 8285 | 114K | 355K | | Q101 | 0 | 6 | INF | | Q4 | 1327 | 6170 | 0 | |
| Q7 | 8285 | 0 | INF | | | | | | | Q5 | 469 | 1326 | 2290 | |

(1) Reading may vary according to the condition of the electrolytic in the circuit.

SCHEMATIC NOTES

For SAFETY use only equivalent replacement part, see parts list.

—*— Circuitry not used in some versions

--- Circuitry used in some versions

⦿ See parts list

⏏ Ground

⏏ Chassis

Waveforms and voltages are taken from ground, unless noted otherwise.

Item numbers in rectangles appear in the alignment/adjustment instructions.

Supply voltages maintained as shown at input.

Voltages measured with digital meter, no signal.

Controls adjusted for normal operation.

Terminal identification may not be found on unit.

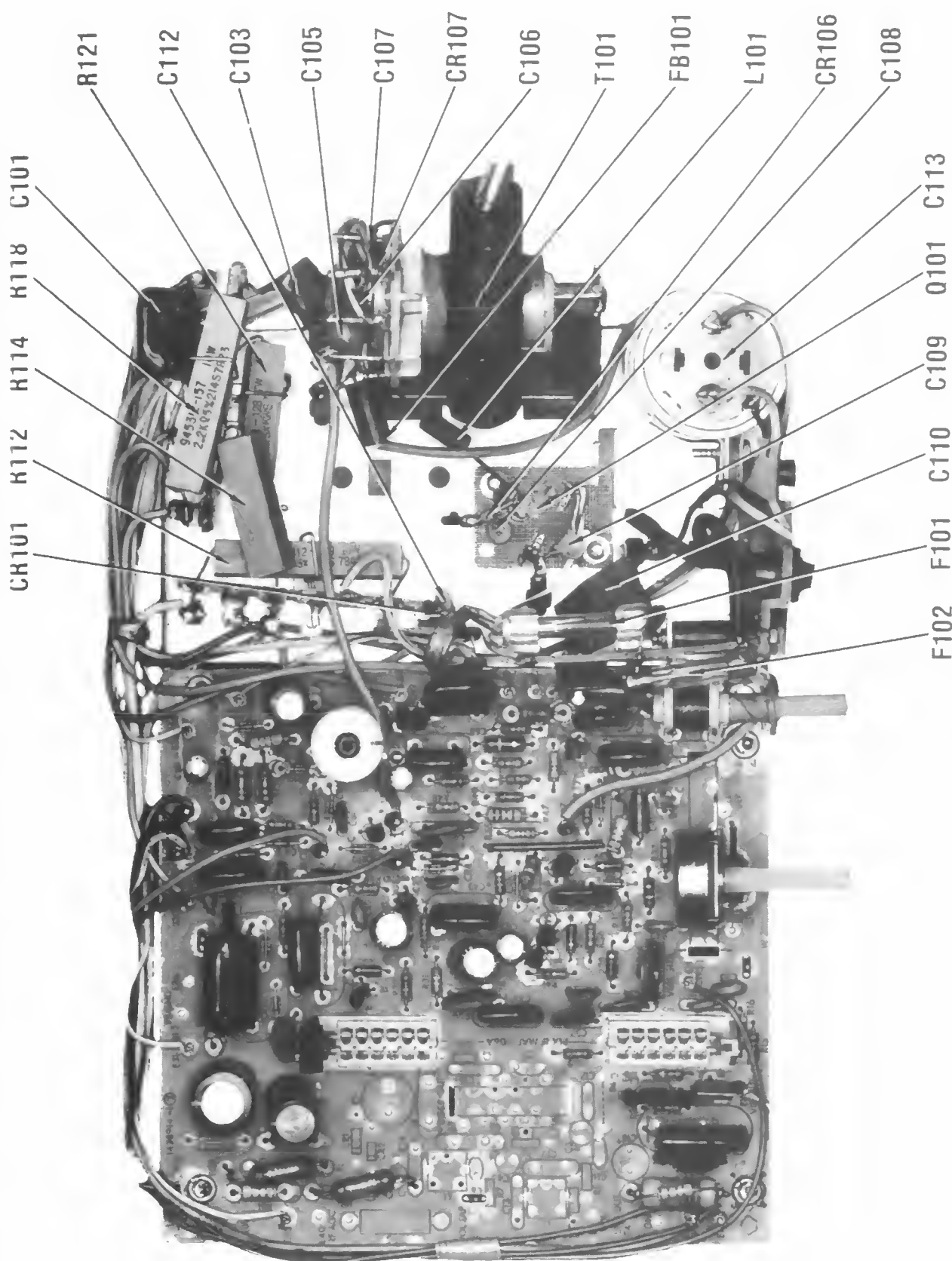
Capacitors are 50 volts or less, 5% unless noted.

Electrolytic capacitors are 50 volts or less, 20% unless noted.

Resistors are ½W or less, 5% unless noted.

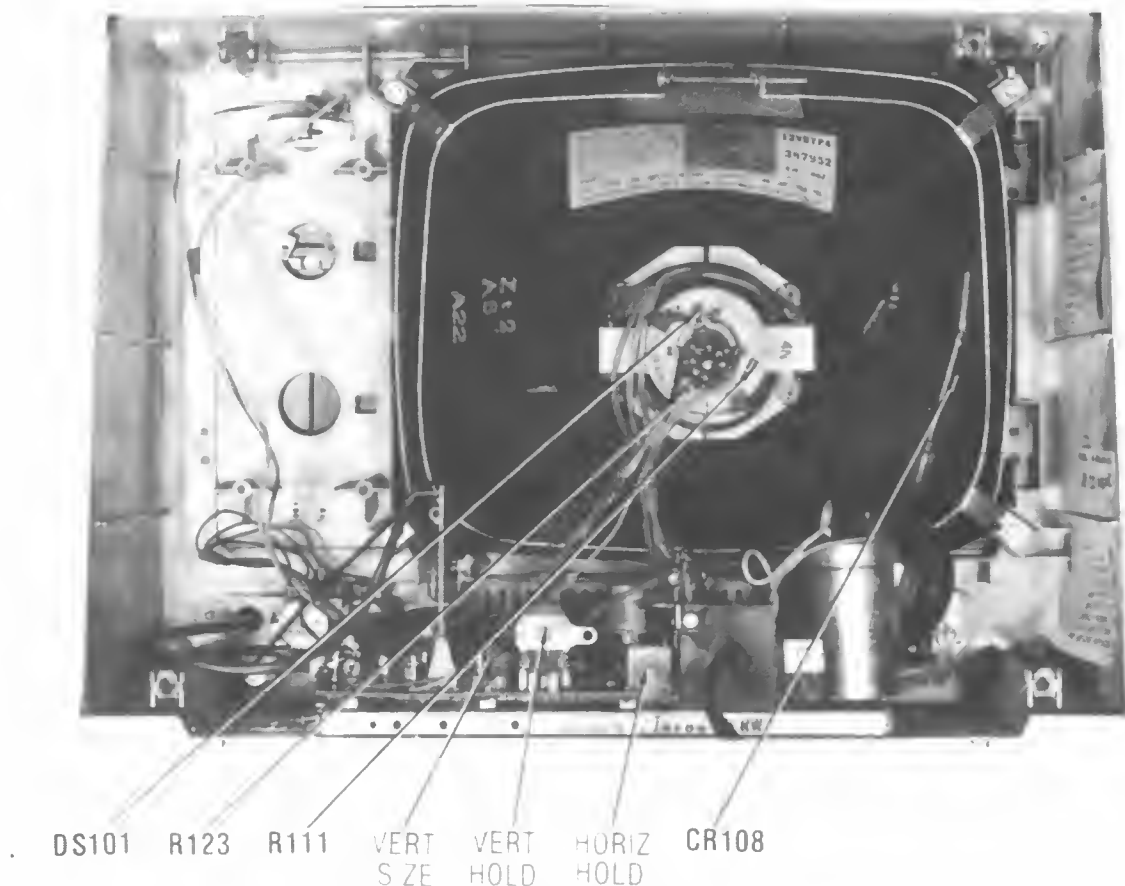
Value in () used in some versions.

Measurements with switching as shown, unless noted.



RADIO SHACK TRS-80
MODEL I LEVEL II

CHASSIS-TOP VIEW



CABINET-REAR VIEW

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

Remove five screws holding cabinet back and remove back. Disconnect CRT socket, HV anode and ground wires. Loosen and remove CRT neck assembly and remove main chassis from cabinet. Remove knobs from cabinet front. Remove two screws holding control bracket to cabinet front and remove bracket.

CRT REMOVAL

Follow "Chassis Removal" procedure and lay set facedown on a soft protective surface. Remove four screws holding CRT to cabinet front and lift CRT out of cabinet. **Do not** lift CRT by the neck.

SERVICING IN THE FIELD

CRT IMPLOSION PROTECTION AND CLEANING

Implosion protection is an integral part of the picture tube, cleaning accomplished without CRT removal.

FUSE DEVICES

A 5-amp and 1-amp fuse are used for AC line protection. (See Placement Chart.)

HORIZONTAL OSCILLATOR

Adjustment of the horizontal hold is accomplished by the proper setting of the horizontal hold coil. (See photo, Cabinet-Rear View.)

CENTERING

Centering is accomplished by proper adjustment of two magnetic rings located on the yoke rear cover.

KEYBOARD, CPU BOARD

See Folder CSCS3

PRELIMINARY SERVICE CHECKS

ENCLOSED

SAFETY PRECAUTIONS

See page 9.

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| Expansion Interface Board | 8,13 | Safety Precautions | 9 |
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| Line Definitions | 15 | Expansion Interface Board | 2,19,20,21 |
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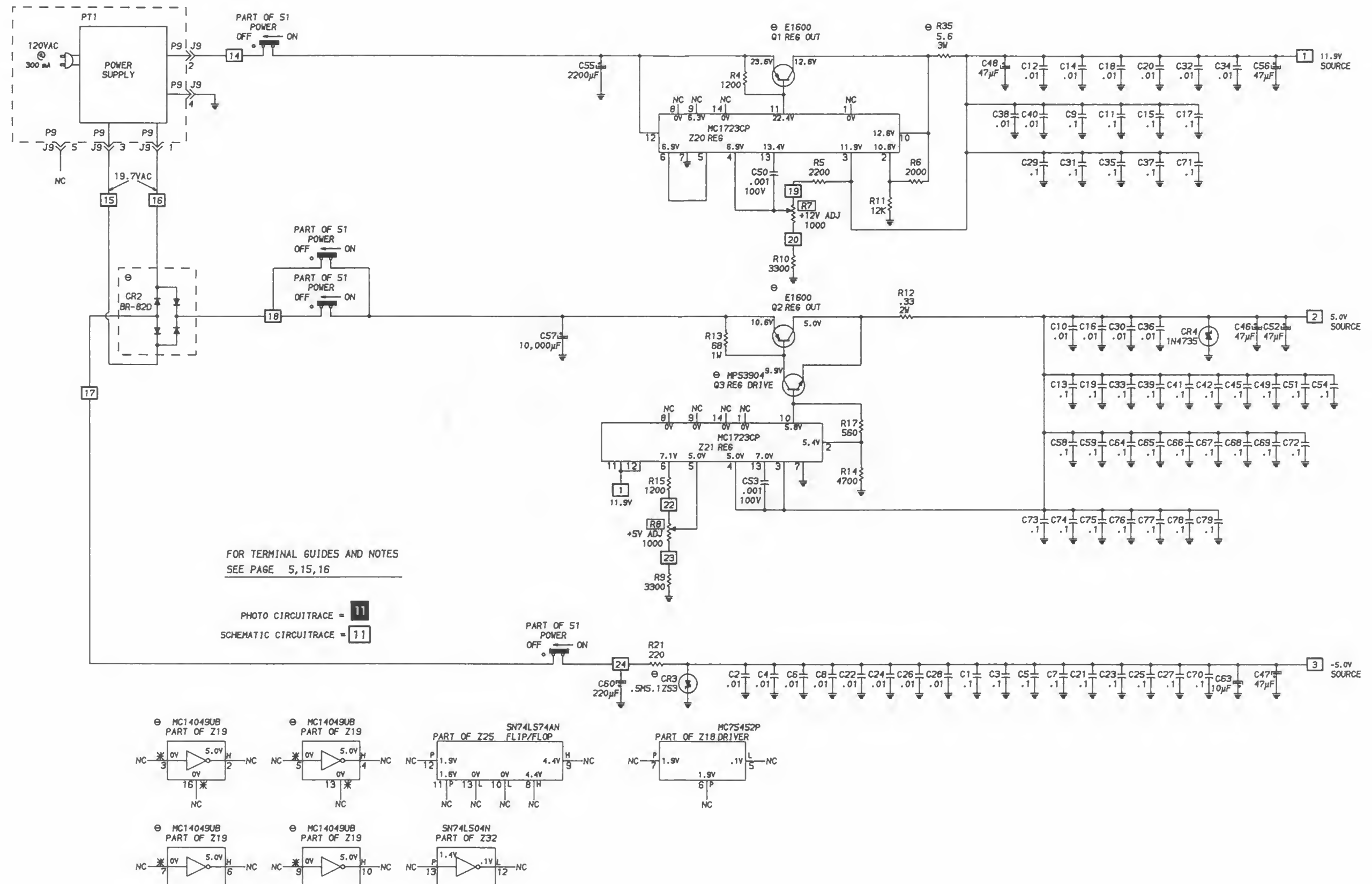
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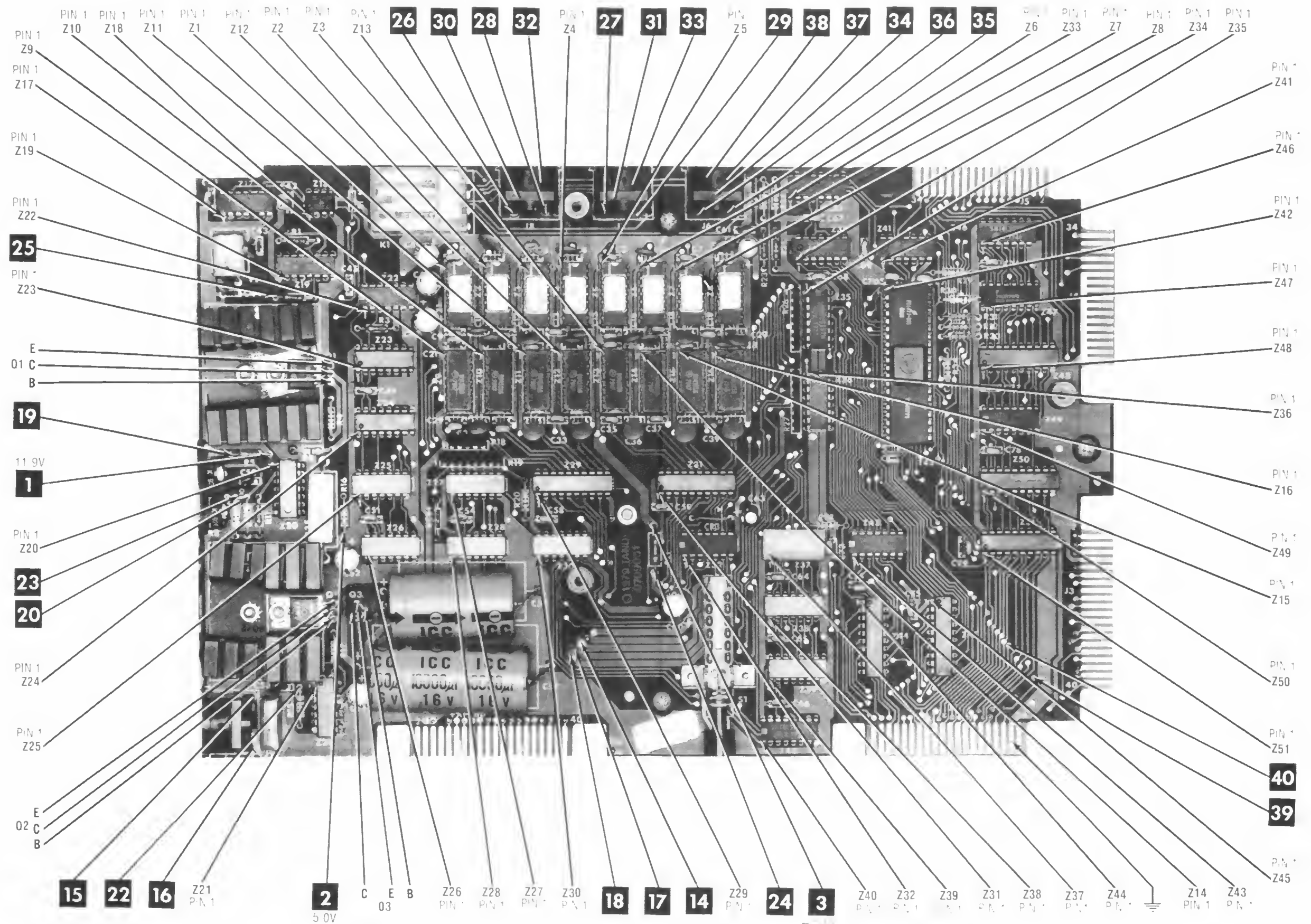
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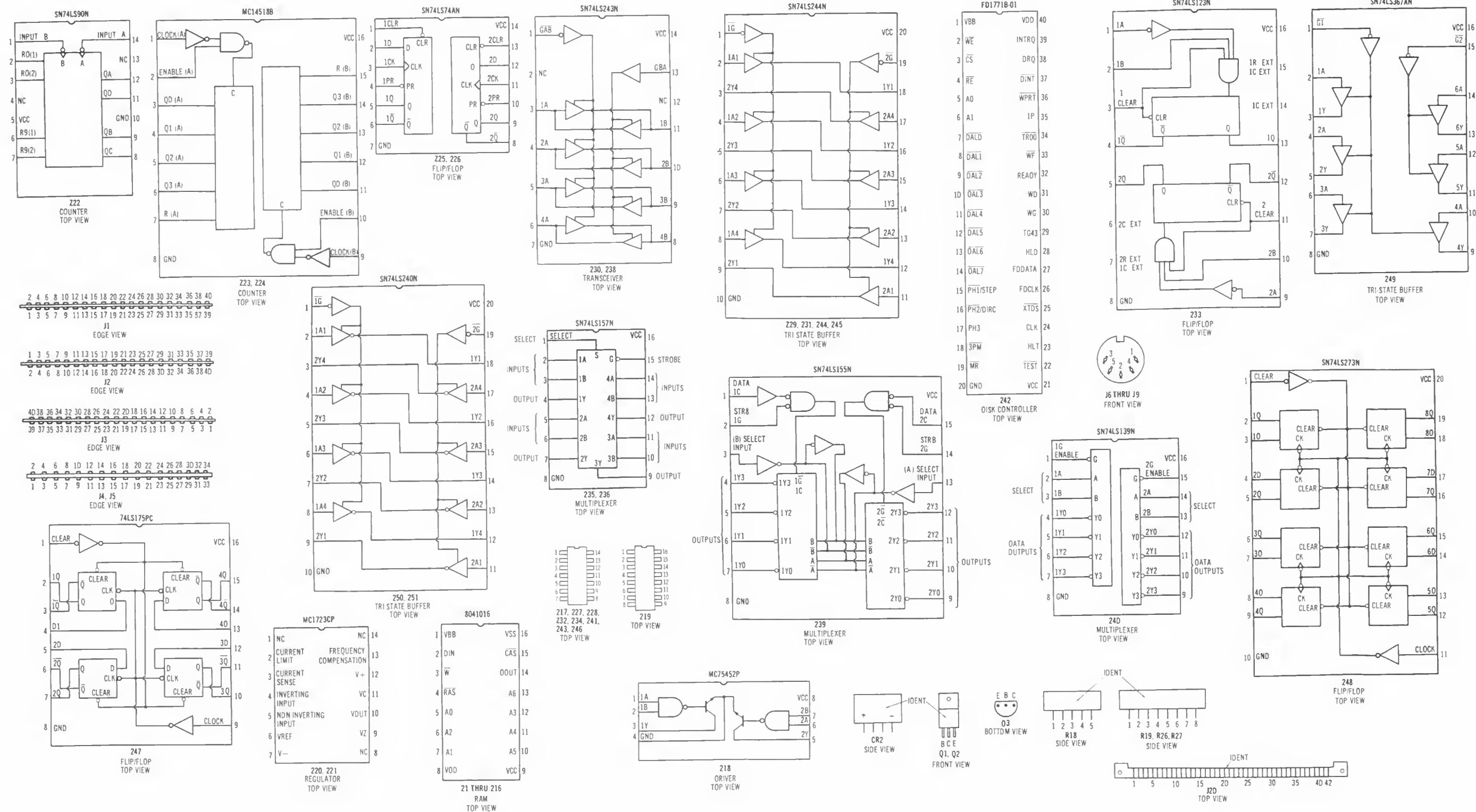
RADIO SHACK TRS-80
MODEL I LEVEL II

EXPANSION INTERFACE BOARD

A Howard W. Sams **CIRCUITRACE** Photo

EXPANSION INTERFACE BOARD

IC PINOUTS & TERMINAL GUIDES



CSCS-3-A
RADIO SHACK TRS-80
MODEL I LEVEL II

MISCELLANEOUS ADJUSTMENTS

12V AND 5V ADJUSTMENT

NOTE: Perform 12V adjustment before 5V adjustment.

Connect the input of a DC voltmeter to pin 3 of Regulator IC (Z20). Adjust the 12V Adjust Control (R7) for 11.9V.

Connect the input of a DC voltmeter to pin 3 of Regulator IC (Z21). Adjust the 5V Adjust Control (R8) for 5.0V.

LOGIC CHART

| PIN NO. | IC Z1 | IC Z2 | IC Z3 | IC Z4 | IC Z5 | IC Z6 | IC Z7 | IC Z8 | IC Z9 | IC Z10 | IC Z11 | IC Z12 | IC Z13 | IC Z14 |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | L | L | L | L | L | L | L | L | L | L | L | L | L | L |
| 2 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 3 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 4 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 5 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 6 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 7 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 8 | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| 9 | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| 10 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 11 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 12 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 13 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 14 | P | P | P | P | P | P | P | P | P | P | P | P | P | P |
| 15 | H | H | H | H | H | H | H | H | H | H | H | H | H | H |
| 16 | L | L | L | L | L | L | L | L | L | L | L | L | L | L |
| PIN NO. | IC Z15 | IC Z16 | IC Z17 | IC Z18 | IC Z19 | IC Z20 | IC Z21 | IC Z22 | IC Z23 | IC Z24 | IC Z25 | IC Z26 | IC Z27 | IC Z28 |
| 1 | L | L | P | H | H | (1) | (1) | P | L | L | H | H | P | H |
| 2 | P | P | L | H | H | | | L | P | P | P | L | H | H |
| 3 | P | P | H | L | * | | | L | P | P | H | P | H | L |
| 4 | P | P | H | L | H | | | * | P | P | | H | P | L |
| 5 | P | P | L | L | * | | | H | P | P | P | L | P | P |
| 6 | P | P | H | P | * | | | L | P | P | P | H | P | H |
| 7 | P | P | L | P | * | | | L | P | P | L | L | P | L |
| 8 | H | H | L | H | L | | | P | L | L | H | L | P | P |
| 9 | H | H | H | | * | | | P | L | L | H | H | P | P |
| 10 | P | P | H | | H | | | L | P | P | L | L | P | P |
| 11 | P | P | H | | P | | | P | P | P | P | H | P | P |
| 12 | P | P | H | | P | | | P | P | P | P | L | P | P |
| 13 | P | P | L | | * | | | * | P | P | L | H | H | P |
| 14 | P | P | H | | P | | | P | P | P | H | H | H | H |
| 15 | H | H | | | P | | | L | H | | | | | |
| 16 | L | L | | | * | | | H | | H | | | | |

NOTE: Logic probe readings taken with computer turned On, no keys pressed, unless otherwise noted.

Logic Probe Display

L = Low

H = High

P = Pulse

* = Open (No light On)

(1) Logic readings not taken.

LOGIC CHART (Continued)

| PIN NO. | IC Z29 | IC Z30 | IC Z31 | IC Z32 | IC Z33 | IC Z34 | IC Z35 | IC Z36 | IC Z37 | IC Z38 | IC Z39 | IC Z40 | IC Z41 |
|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | L | L* | L | P | L | L* | P | P | (1) | L* | P | P | P |
| 2 | P | * | P | P | H | L | P | P | | P | H | P | P |
| 3 | P | P | P | H | H | L | P | P | | P | P | L | L |
| 4 | P | P | P | L | H | * | P | P | | P | H | P | * |
| 5 | P | P | P | P | L | L* | P | P | | P | H | P | L* |
| 6 | P | P | P | P | L | L* | P | P | | P | H | P | L* |
| 7 | P | L | P | L | L | L* | P | P | | P | H | P | L* |
| 8 | P | H | P | L | L | * | L | L | | P | H | P | L* |
| 9 | P | P | P | H | H | L | P | P | | P | H | P | L* |
| 10 | L | P | L | P | H | L | P | P | | P | H | P | L* |
| 11 | P | * | P | P | H | L | P | P | | * | H | P | L* |
| 12 | P | | P | L | H | L | P | H | | | H | P | L* |
| 13 | P | L | P | P | L | H | L | P | | L | P | P | L |
| 14 | P | | P | P | L | H | P | L | | | P | P | H |
| 15 | P | | P | P | L | | L | H | | | P | P | H |
| 16 | P | | P | P | H | | L | H | | | P | P | H |
| 17 | P | | P | | | | | | | | | | |
| 18 | P | | P | | | | | | | | | | |
| 19 | H | | H | | | | | | | | | | |
| 20 | H | | H | | | | | | | | | | |

| PIN NO. | IC Z42 | PIN NO. | IC Z42 | PIN NO. | IC Z43 | IC Z44 | IC Z45 | IC Z46 | IC Z47 | IC Z48 | IC Z49 | IC Z50 | IC Z51 |
|---------|--------|---------|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1 | L | 21 | H | 1 | L | L | L | H | L | H | H | H | H |
| 2 | H | 22 | H | 2 | P | L | L | H | L | L | P | P | P |
| 3 | L | 23 | L | 3 | P | L | P | * | H | P | P | P | P |
| 4 | H | 24 | P | 4 | P | P | P | H | P | P | P | P | P |
| 5 | P | 25 | H | 5 | P | P | P | H | P | L | P | P | P |
| 6 | P | 26 | H | 6 | P | P | P | L | H | L | P | P | P |
| 7 | * | 27 | L | 7 | L | P | P | L | L | L | P | P | P |
| 8 | * | 28 | L | 8 | H | P | P | P | L | L | P | P | P |
| 9 | * | 29 | L | 9 | * | L | P | P | H | L | P | P | P |
| 10 | * | 30 | L | 10 | * | L | L | P | L | L | H | L | * |
| 11 | * | 31 | L | 11 | P | L | L | P | H | H | H | * | * |
| 12 | * | 32 | L | 12 | P | P | P | P | P | H | H | * | * |
| 13 | * | 33 | H | 13 | * | P | P | P | H | P | P | * | * |
| 14 | * | 34 | H | 14 | H | P | P | P | H | L | H | * | * |
| 15 | L | 35 | H | 15 | | P | P | P | | L | H | * | * |
| 16 | L | 36 | H | 16 | | P | P | P | | H | H | * | * |
| 17 | L | 37 | H | 17 | | L | P | P | | P | | * | * |
| 18 | H | 38 | L | 18 | | P | L | P | | P | P | * | * |
| 19 | H | 39 | H | 19 | | L | L | H | | H | | H | H |
| 20 | L | 40 | H | 20 | | H | H | | | | | H | H |

NOTE: Logic probe readings taken with computer turned On, no keys pressed, unless otherwise noted.

Logic Probe Display

L = Low

H = High

P = Pulse

* = Open (No light On)

(1) Logic readings not taken.

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

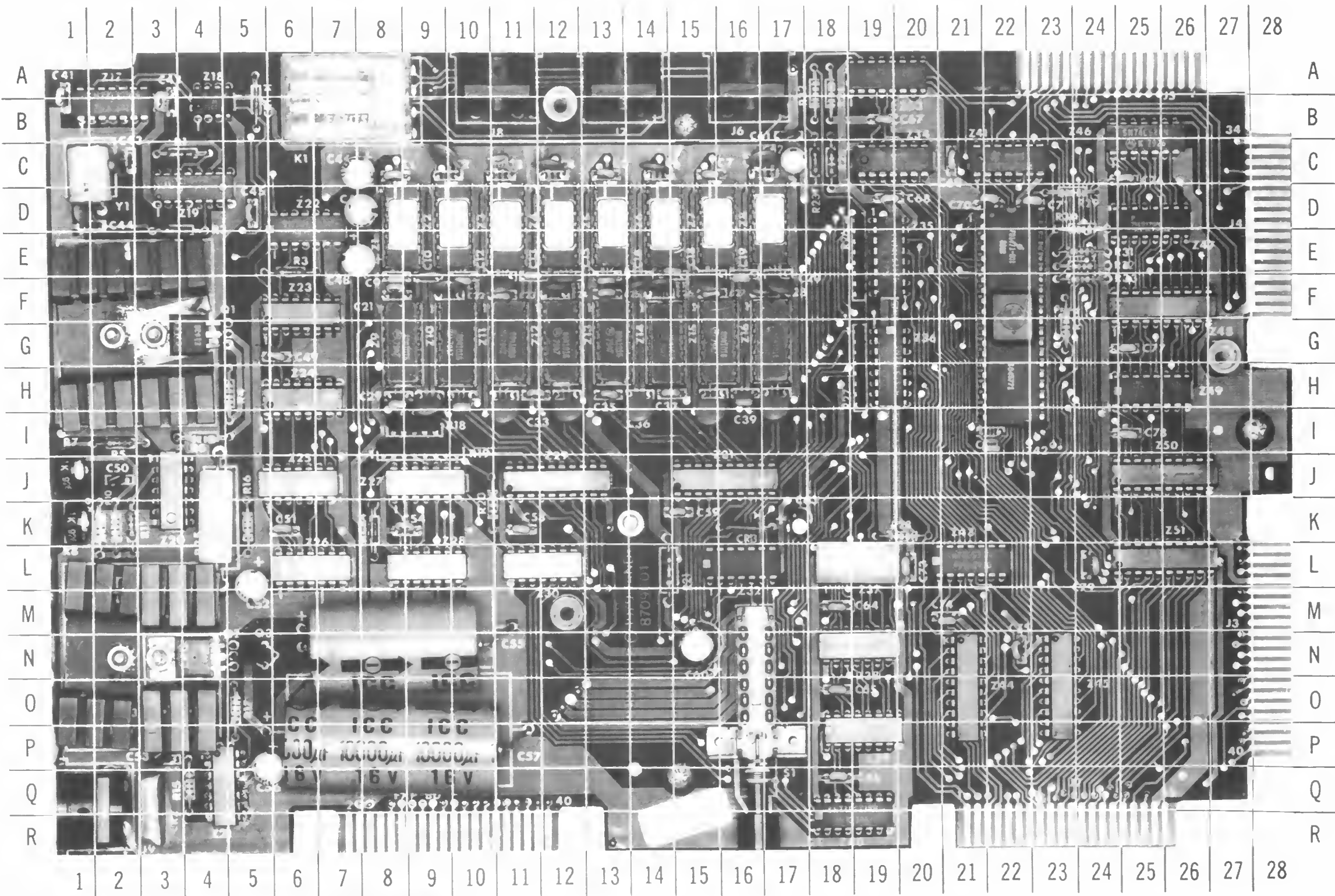
Remove six screws from cabinet bottom. Remove cabinet bottom from unit. All components are now accessible for service.

CSCS3-A

**RADIO SHACK TRS-80
MODEL I LEVEL II**

EXPANSION INTERFACE BOARD GridTrace
LOCATION GUIDE

| | |
|-----|------|
| C1 | C-8 |
| C2 | C-9 |
| C3 | C-11 |
| C4 | C-12 |
| C5 | C-13 |
| C6 | C-14 |
| C7 | C-15 |
| C8 | C-17 |
| C9 | F-8 |
| C10 | E-9 |
| C11 | F-10 |
| C12 | F-11 |
| C13 | E-11 |
| C14 | F-12 |
| C15 | F-13 |
| C16 | F-14 |
| C17 | E-15 |
| C18 | F-15 |
| C19 | F-16 |
| C20 | F-17 |
| C21 | F-8 |
| C22 | F-9 |
| C23 | F-11 |
| C24 | F-12 |
| C25 | F-13 |
| C26 | F-14 |
| C27 | F-15 |
| C28 | F-17 |
| C29 | H-8 |
| C30 | H-9 |
| C31 | H-10 |
| C32 | H-11 |
| C33 | H-11 |
| C34 | H-12 |
| C35 | H-13 |
| C36 | H-14 |
| C37 | H-14 |
| C38 | H-15 |
| C39 | H-16 |
| C40 | H-17 |
| C41 | A-1 |
| C42 | B-3 |
| C43 | C-2 |
| C44 | D-1 |
| C45 | D-5 |
| C46 | C-7 |
| C47 | D-7 |
| C48 | E-7 |
| C49 | G-6 |
| C50 | J-2 |
| C51 | K-6 |
| C52 | L-5 |
| C53 | D-3 |
| C54 | K-9 |
| C55 | N-8 |
| C56 | P-5 |
| C57 | P-8 |
| C58 | K-11 |
| C59 | K-15 |
| C60 | N-15 |
| C61 | B-17 |
| C62 | C-17 |
| C63 | K-17 |
| C64 | M-18 |
| C65 | O-18 |
| C66 | Q-18 |
| C67 | B-19 |
| C68 | D-19 |
| C69 | CR2 |
| C70 | D-22 |
| C71 | D-23 |
| C72 | I-22 |
| C73 | L-20 |



EXPANSION INTERFACE BOARD

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| | | | | | | | | | | | | | | | | | |
|-----|------|----|------|-----|-----|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|
| C74 | M-21 | J8 | A-11 | R7 | J-1 | R19 | I-9 | R31 | E-24 | Z7 | D-16 | Z19 | D-4 | Z31 | J-16 | Z42 | F-22 |
| C75 | N-22 | J9 | Q-1 | R8 | K-1 | R20 | K-10 | R32 | E-24 | Z8 | D-17 | Z20 | J-3 | Z32 | L-16 | Z43 | L-21 |
| C76 | C-25 | K1 | B-7 | R9 | K-2 | R21 | L-14 | R33 | F-24 | Z9 | G-8 | Z21 | Q-4 | Z33 | A-19 | Z44 | O-21 |
| C77 | G-25 | Q1 | G-4 | R10 | K-2 | R22 | A-18 | R34 | G-23 | Z10 | G-10 | Z22 | D-6 | Z34 | C-19 | Z45 | O-23 |
| C78 | I-25 | Q2 | N-4 | R11 | K-2 | R23 | C-18 | R35 | K-4 | Z11 | G-11 | Z23 | F-6 | Z35 | E-19 | Z46 | B-25 |
| C79 | L-24 | Q3 | N-5 | R12 | M-3 | R24 | A-18 | Y1 | C-1 | Z12 | G-12 | Z24 | H-6 | Z36 | G-19 | Z47 | D-25 |
| CR1 | B-5 | R1 | C-4 | R13 | O-3 | R25 | C-18 | Z1 | D-9 | Z13 | G-13 | Z25 | J-6 | Z37 | L-19 | Z48 | F-25 |
| CR2 | Q-3 | R2 | D-3 | R14 | P-3 | R26 | E-19 | Z2 | D-10 | Z14 | G-14 | Z26 | L-6 | Z38 | N-19 | Z49 | H-25 |
| CR3 | K-16 | R3 | E-6 | R15 | Q-4 | R27 | H-19 | Z3 | D-11 | Z15 | G-15 | Z27 | J-9 | Z39 | P-19 | Z50 | J-25 |
| CR4 | K-8 | R4 | H-5 | R16 | K-5 | R28 | K-20 | Z4 | D-12 | Z16 | G-17 | Z28 | L-9 | Z40 | R-18 | Z51 | L-25 |
| J6 | A-16 | R5 | I-2 | R17 | O-5 | R29 | D-24 | Z5 | D-13 | Z17 | A-2 | Z29 | J-12 | Z41 | C-22 | | |
| J7 | A-13 | R6 | I-4 | R18 | I-9 | R30 | E-24 | Z6 | D-14 | Z18 | B-4 | Z30 | L-12 | | | | |

EXPANSION INTERFACE BOARD

RADIO SHACK TRS-80
MODEL I LEVEL II

SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the computer system before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.
4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
5. Use a grounded-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install boards, floppy disk drives, printers, or other peripherals with computer system AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. Periodically examine the AC power cord for damaged or cracked insulation.
10. The computer system cabinet is equipped with vents to prevent heat build-up. Never block, cover, or obstruct these vents.
11. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
12. Never expose the computer system to water. If exposed to water turn the unit Off. Do not place the computer system near possible water sources.
13. Never leave the computer system unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.
14. Do not allow anything to rest on AC power cord.
15. Unplug AC power cord from outlet before cleaning computer system.
16. Never use liquids or aerosols directly on the computer system. Spray on cloth and then apply to the computer system cabinet. Make sure the computer system is disconnected from the AC power line.

CSCS-3-A

**RADIO SHACK TRS-80
MODEL I LEVEL II**

PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

| ITEM No. | TYPE No. | MFG. PART No. | REPLACEMENT DATA | | | | | |
|----------|------------|---------------|---------------------------|-----------------------|----------------------|--------------|------------------|-----------------|
| | | | GENERAL ELECTRIC PART No. | NEW-TONE NTE PART No. | PHILIPS ECG PART No. | RCA PART No. | WORKMAN PART No. | ZENITH PART No. |
| CR1 | 1N4148 | 4800002 | GE-514 | NTE519 | ECG519 | SK3100/519 | WEP925/519 | 103-131 |
| CR2 | BR-82D | | GE-167 | NTE167 | ECG167 | SK3647/167 | WEP1052/167 | 212-Z9001 |
| CR3 | MDA202 | 4800023 | GE-167 | NTE167 | ECG167 | SK3647/167 | WEP1052/167 | 212-Z9001 |
| | .5M5.1Z53 | | GEZD-5.1 | NTE5010A | ECG5010A | SK5A1/5010A | WEP1411/5010 | 103-279-10 |
| CR4 | 1N5231 | 4800022 | GEZD-5.1 | NTE5010A | ECG5010A | SK5A1/5010A | WEP1411/5010 | 103-279-10 |
| | T4446 | | | | | | | |
| Q1, 2 | 1N4735 | 4800021 | GEZD-6.2 | NTE137A | ECG137A | SK6V2/137A | WEP1154/137 | 103-Z9008 |
| | E1600 | | | | | | | |
| Q3 | MJE2955 | | GE-56 | NTE183 | ECG183 | SK3189A/183 | WEP748/183 | |
| | MPS3904 | | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| | 2N3904 | 4822001 | GE-123AP | NTE123AP | ECG123AP | SK3854/123AP | WEP736/123A | 121-Z9000A |
| Z1 thru | | | | | | | | |
| Z16 | 8041016 | | | NTE2117 | ECG2117 | | | HE-443-904 |
| Z17 | MK4116 | | 74LS00 | NTE74LS00 | ECG74LS00 | SK74LS00 | | HE-443-728 |
| Z18 | SN74LS00N | 3102006 | | NTE74LS00 | ECG74LS00 | | | HE-443-74 |
| Z19 | MC75452P | 3106002 | | NTE75452B | ECG75452B | | | 221-Z9074 |
| | MC14049UB | | GE-4049 | NTE4049 | ECG4049 | SK4049UB | | 221-Z9074 |
| | 4049B | | GE-4049 | NTE4049 | ECG4049 | SK4049UB | | |
| Z20, 21 | MC1723CP | 3100001 | GE1C-260 | NTE9230 | ECG9230 | SK3165/9230 | WEP2331/9230 | 221-Z9020 |
| Z22 | SN74LS90N | | 74LS90 | NTE74LS90 | ECG74LS90 | SK74LS90 | | |
| Z23, 24 | MC145188 | | GE-4518 | NTE45188 | ECG45188 | SK45188 | | HE-443-737 |
| Z25, 26 | SN74LS74AN | 3102015 | 74LS74A | NTE74LS74A | ECG74LS74A | SK74LS74A | | HE-443-730 |
| Z27 | SN74LS32N | 3102014 | 74LS32 | NTE74LS32 | ECG74LS32 | SK74LS32 | | HE-443-875 |
| Z28 | SN74LS00N | | 74LS00 | NTE74LS00 | ECG74LS00 | SK74LS00 | | HE-443-728 |
| Z29 | SN74LS244N | 3102006 | 74LS244 | NTE74LS244 | ECG74LS244 | SK74LS244 | | HE-443-791 |
| Z30 | SN74LS243N | | | NTE74LS243 | ECG74LS243 | SK74LS243 | | HE-443-839 |
| Z31 | SN74LS244N | | 74LS244 | NTE74LS244 | ECG74LS244 | SK74LS244 | | HE-443-791 |
| Z32 | SN74LS04N | 3102008 | 74LS04 | NTE74LS04 | ECG74LS04 | SK74LS04 | | HE-443-755 |
| Z33 | SN74LS123N | | 74LS123 | NTE74LS123 | ECG74LS123 | SK74LS123 | | HE-443-942 |
| Z34 | DM7416N | | GE-7416 | NTE7416 | ECG7416 | SK7416 | | HE-443-73 |
| Z35, 36 | SN74LS157N | 3102020 | 74LS157 | NTE74LS157 | ECG74LS157 | SK74LS157 | | HE-443-799 |
| Z38 | SN74LS243N | | | NTE74LS243 | ECG74LS243 | SK74LS243 | | HE-443-839 |
| Z39 | SN74LS155N | | | NTE74LS155 | ECG74LS155 | SK74LS155 | | HE-443-782 |

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

| ITEM No. | TYPE No. | MFR. PART No. | REPLACEMENT DATA | | | | | |
|-------------------------------------|---|--------------------|---|---|---|--|------------------|--|
| | | | GENERAL ELECTRIC PART No. | NEW-TONE NTE PART No. | PHILIPS ECG PART No. | RCA PART No. | WORKMAN PART No. | ZENITH PART No. |
| Z40 Z41 Z42 Z43 Z44, 45 | SN74LS139N DM7416N FD1771B-01 SN74LS30N SN74LS244N | 3102013 | 74LS139 GE-7416 74LS30 74LS244 | NTE74LS139 NTE7416 NTE74LS30 NTE74LS244 | ECG74LS139 ECG7416 ECG74LS30 ECG74LS244 | SK74LS139 SK7416 SK74LS30 SK74LS244 | | HE-443-73 HE-443-732 HE-443-791 |
| Z46 Z47 Z48 Z49 Z50, 51 | SN74LS20N 74LS175PC SN74LS273N SN74LS367AN SN74LS240N | 3102023 3102024 | 74LS20 74LS175 74LS273 74LS367A 74LS240 | NTE74LS20 NTE74LS175 NTE74LS273 NTE74LS367 NTE74LS240 | ECG74LS20 ECG74LS175 ECG74LS273 ECG74LS367 ECG74LS240 | SK74LS20 SK74LS175 SK74LS273 SK74LS367 SK74LS240 | | HE-443-798 HE-443-752 HE-443-805 HE-443-857 HE-443-754 |

CAPACITORS Items not listed are normally available at local distributors.

| ITEM No. | RATING | MFR. PART No. | ITEM No. | RATING | MFR. PART No. |
|----------|---------------|---------------|----------|--------|---------------|
| C43 | 10pF N750 50V | | | | |

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

CONTROLS (All wattages ½ watt, or less, unless listed)

| ITEM NO. | FUNCTION | RESISTANCE | MFGR. PART NO. | NOTES |
|----------|---------------------------|--------------|--------------------|-------|
| R7 R8 | +12V Adjust +5V Adjust | 1000 1000 | 4750019 4750019 | |

RESISTORS (Power and Special)

| ITEM No. | RATING | REPLACEMENT DATA | | |
|---------------------------------|--|------------------|-------------------|------------------|
| | | MFGR. PART No. | NEW-TONE PART No. | WORKMAN PART No. |
| R18 R19 R26 R27 R35 | Resistor Network (1) Resistor Network (2) Resistor Network (2) Resistor Network (2) 5.6 5% 3W WW | 4717003 | | |

(1) Contains four 4700, 10%.

(2) Contains four 33, 10%.

MISCELLANEOUS

| ITEM No. | PART NAME | MFGR. PART No. | NOTES |
|----------|--------------|----------------------|---------------------------|
| K1 | Relay | FRL-414D005/04CT (1) | Motor Control, 5V 42 Ohms |
| PT1 | Power Supply | 4000004 | |
| S1 | Switch | | AC Power On-Off |
| Y1 | Crystal | | 4.0MHz |
| Z37 | Delay Line | DDU-4-7835 (1) | |
| | P.C. Board | 8709001 | Expansion Interface |

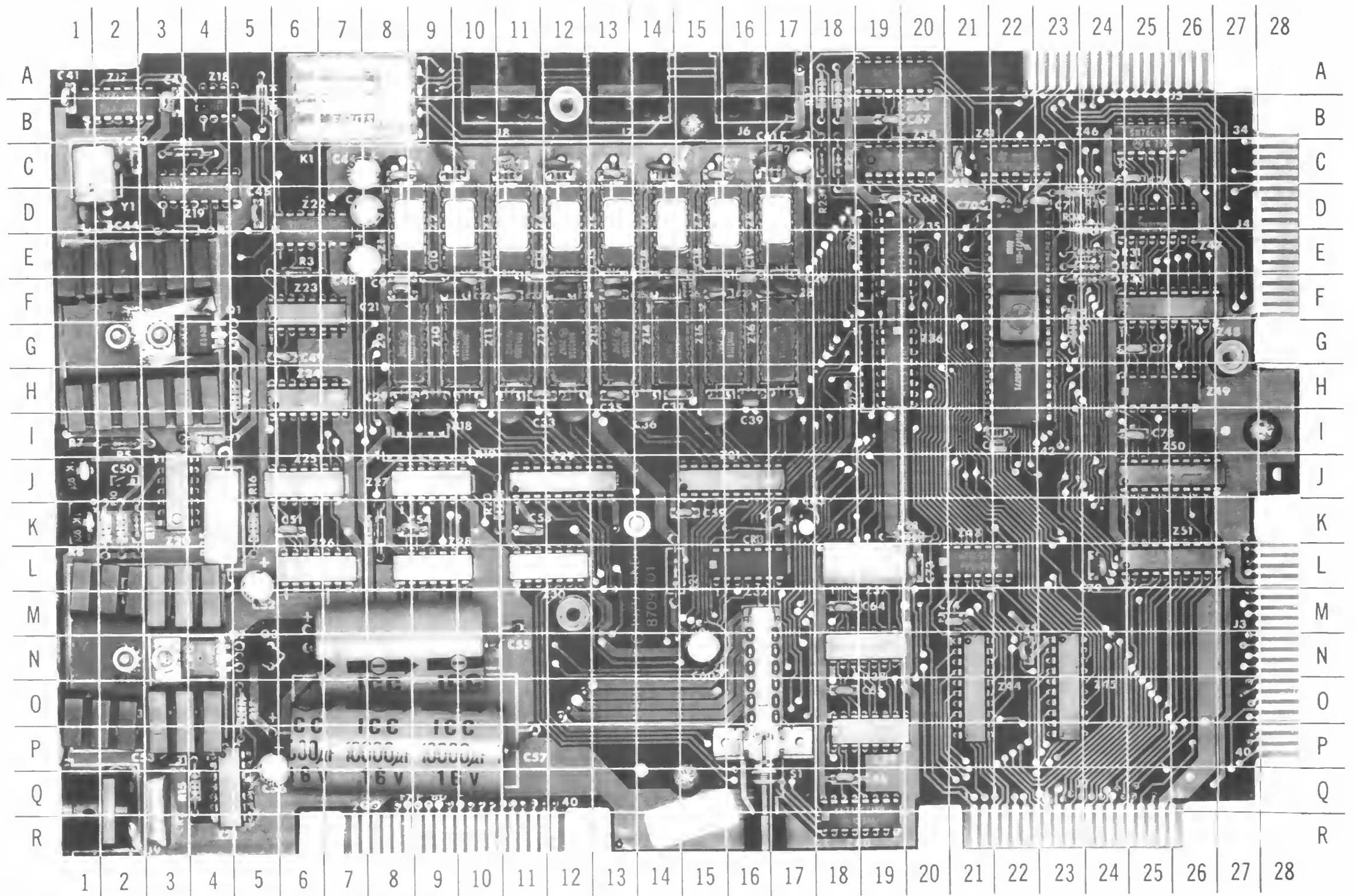
(1) Number on unit.

CABINET & CABINET PARTS (When ordering specify model, chassis & color)

| ITEM | PART No. | ITEM | PART No. |
|-----------------|----------|---------------------------------|----------|
| Cabinet, Top | | Cover, Power Supply Compartment | |
| Cabinet, Bottom | | Cover, Expansion Compartment | |

EXPANSION INTERFACE BOARD GridTrace
LOCATION GUIDE

| | |
|-----|------|
| C1 | C-8 |
| C2 | C-9 |
| C3 | C-11 |
| C4 | C-12 |
| C5 | C-13 |
| C6 | C-14 |
| C7 | C-15 |
| C8 | C-17 |
| C9 | F-8 |
| C10 | E-9 |
| C11 | F-10 |
| C12 | F-11 |
| C13 | E-11 |
| C14 | F-12 |
| C15 | F-13 |
| C16 | F-14 |
| C17 | E-15 |
| C18 | F-15 |
| C19 | F-16 |
| C20 | F-17 |
| C21 | F-8 |
| C22 | F-9 |
| C23 | F-11 |
| C24 | F-12 |
| C25 | F-13 |
| C26 | F-14 |
| C27 | F-15 |
| C28 | F-17 |
| C29 | H-8 |
| C30 | H-9 |
| C31 | H-10 |
| C32 | H-11 |
| C33 | H-11 |
| C34 | H-12 |
| C35 | H-13 |
| C36 | H-14 |
| C37 | H-14 |
| C38 | H-15 |
| C39 | H-16 |
| C40 | H-17 |
| C41 | A-1 |
| C42 | B-3 |
| C43 | C-2 |
| C44 | D-1 |
| C45 | D-5 |
| C46 | C-7 |
| C47 | D-7 |
| C48 | E-7 |
| C49 | G-6 |
| C50 | J-2 |
| C51 | K-6 |
| C52 | L-5 |
| C53 | D-3 |
| C54 | K-9 |
| C55 | N-8 |
| C56 | P-5 |
| C57 | P-8 |
| C58 | K-11 |
| C59 | K-15 |
| C60 | N-15 |
| C61 | B-17 |
| C62 | C-17 |
| C63 | K-17 |
| C64 | M-18 |
| C65 | O-18 |
| C66 | Q-18 |
| C67 | B-19 |
| C68 | D-19 |
| C69 | CR2 |
| C70 | D-22 |
| C71 | D-23 |
| C72 | I-22 |
| C73 | L-20 |



EXPANSION INTERFACE BOARD

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| | | | | | | | | | | | | | | | | | |
|-----|------|----|------|-----|-----|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|
| C74 | M-21 | J8 | A-11 | R7 | J-1 | R19 | I-9 | R31 | E-24 | Z7 | D-16 | Z19 | D-4 | Z31 | J-16 | Z42 | F-22 |
| C75 | N-22 | J9 | Q-1 | R8 | K-1 | R20 | K-10 | R32 | E-24 | Z8 | D-17 | Z20 | J-3 | Z32 | L-16 | Z43 | L-21 |
| C76 | C-25 | K1 | B-7 | R9 | K-2 | R21 | L-14 | R33 | F-24 | Z9 | G-8 | Z21 | Q-4 | Z33 | A-19 | Z44 | O-21 |
| C77 | G-25 | Q1 | G-4 | R10 | K-2 | R22 | A-18 | R34 | G-23 | Z10 | G-10 | Z22 | D-6 | Z34 | C-19 | Z45 | O-23 |
| C78 | I-25 | Q2 | N-4 | R11 | K-2 | R23 | C-18 | R35 | K-4 | Z11 | G-11 | Z23 | F-6 | Z35 | E-19 | Z46 | B-25 |
| C79 | L-24 | Q3 | N-5 | R12 | M-3 | R24 | A-18 | Y1 | C-1 | Z12 | G-12 | Z24 | H-6 | Z36 | G-19 | Z47 | D-25 |
| CR1 | B-5 | R1 | C-4 | R13 | O-3 | R25 | C-18 | Z1 | D-9 | Z13 | G-13 | Z25 | J-6 | Z37 | L-19 | Z48 | F-25 |
| CR2 | Q-3 | R2 | D-3 | R14 | P-3 | R26 | E-19 | Z2 | D-10 | Z14 | G-14 | Z26 | L-6 | Z38 | N-19 | Z49 | H-25 |
| CR3 | K-16 | R3 | E-6 | R15 | Q-4 | R27 | H-19 | Z3 | D-11 | Z15 | G-15 | Z27 | J-9 | Z39 | P-19 | Z50 | J-25 |
| CR4 | K-8 | R4 | H-5 | R16 | K-5 | R28 | K-20 | Z4 | D-12 | Z16 | G-17 | Z28 | L-9 | Z40 | R-18 | Z51 | L-25 |
| J6 | A-16 | R5 | I-2 | R17 | O-5 | R29 | D-24 | Z5 | D-13 | Z17 | A-2 | Z29 | J-12 | Z41 | C-22 | | |
| J7 | A-13 | R6 | I-4 | R18 | I-9 | R30 | E-24 | Z6 | D-14 | Z18 | B-4 | Z30 | L-12 | | | | |

EXPANSION INTERFACE BOARD

TROUBLESHOOTING

POWER SUPPLY

Disconnect the Power Supply (PT1) from the Expansion Interface Board and check for 19.7VAC between pin 1 and pin 3 of Connector J9 and 23.6V between pin 2 and pin 4 of Connector J9. If the voltages are missing, check the cable and connections at the Connector J9 and check for open AC power cord. If the voltages are present, reconnect the Power Supply to the Expansion Interface Board and turn On the Expansion Interface Board. Check for 5.0V at pin 3 of Regulator IC (Z21), 11.9V at pin 3 of Regulator IC (Z20) and -5.0V at the anode of Zener Diode CR3. If all voltages are missing, check the Power Switch (S1).

If 5.0V is missing, check the voltages and components associated with Regulator Output Transistor (Q2) and Regulator Drive Transistor (Q3) and pins 2 thru 7, 10, 11 and 13 of IC Z21. If the 5.0V source is incorrect, check the adjustment of the 5V Adjust Control (R8).

If the 11.9V is missing, check the voltages and components associated with Regulator Output Transistor (Q1) and pins 2 thru 7, 10, 11 and 13 of IC Z20. If the 11.9V source is incorrect, check the adjustment of the 12V Adjust Control (R7).

If the 5.0V is missing, check Resistor R21, Zener Diode CR3 and check for a possible short to ground.

LINE PRINTER

If the Line Printer Connector (J4) is not operating, type and run the following Basic program and use the following procedure to check the printer interface circuits. NOTE: Do not connect a printer to Connector J4.

```
10 FOR Y = 1 TO 50
20 POKE 14312,0
30 POKE 14312,255
40 X = PEEK(14312)
50 NEXT Y
60 PRINT "X = "; X
70 GOTO 10
```

Check for pulses at pin 1 of the Tri-State Buffer IC (Z49). If pulses are missing, check MUX (Multiplexer) IC (Z39) by substitution. Check the operation of IC Z49 by grounding, one at a time, pins 2, 4, 6 and 10 and observe the number X that appears on the Monitor screen. Use the following chart to determine the correct number for each pin. The number X should equal 255 when none of the pins are grounded.

| | |
|---------------|---------|
| Pin 2 of Z49 | X = 239 |
| Pin 4 of Z49 | X = 223 |
| Pin 6 of Z49 | X = 191 |
| Pin 10 of Z49 | X = 127 |

If any number is incorrect, check IC Z49 by substitution. Check for pulses at pin 11 of the Flip/Flop IC (Z48) and check for the waveform shown in Figure 2 at pins 2, 5, 6, 9, 12, 15, 16 and 19 of IC Z48. If any waveform is missing at IC Z48, check IC Z48 by substitution. If pulses are missing at pin 11 of IC Z48, check IC Z39 by substitution. Check for pulses at pin 4 of Flip/Flop IC (Z33). The pulses should have a width of 2 μ s. If the pulses are missing or the width is incorrect, check Capacitor C61, Resistors R23 and R24 and check Flip/Flop IC Z33 by substitution.

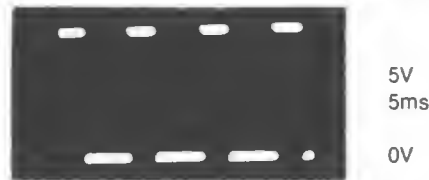


Figure 2

DISK DRIVE

If the Disk Drive Port (J5) is not operating, check for a 1MHz clock signal at pin 24 of the Disk Controller IC (Z42). If the clock is off frequency, check the 4.0MHz Crystal (Y1), Capacitors C43 and C44 and Resistors R1 and R2. If the clock signal is missing at pin 24, check the waveform at pin 3 of Flip/Flop IC (Z25). If the waveform is present at pin 3, check IC Z25 by substitution. If the waveform is missing at pin 3, check the waveform at pin 14 of Counter IC (Z22). If the waveform is present at pin 14, check IC Z22 by substitution. If the waveform is missing at pin 14, check IC Z19 by substitution. Check Crystal Y1, Capacitors C43 and C44 and Resistors R1 and R2. If the clock signal is good at pin 24 of IC Z42, type and run the following Basic program and check for pulses at pins 4, 5, 7, 9 and 11 of Mux (Multiplexer) IC (Z39).

```
10 FOR X = 14304 TO 14316 STEP 4
20 Y = PEEK(X): POKE X,255
30 NEXT X
40 GOTO 10
```

If pulses are missing at any of the pins specified on IC Z39, check IC Z39 by substitution.

The Disk Drive Motor and the LED on the front of the Disk Drive should be On when the above program is running. If the Disk Drive Motor is not running, check the logic reading at pin 5 of Flip/Flop IC (Z33) for a High (while the program is running). If the logic reading at pin 5 is High, check IC Z41 by substitution. If the logic reading at pin 5 is Low, check for pulses at pin 9 of IC Z41. If pulses are missing at pin 9, check IC Z39 by substitution. If pulses are present at pin 9, check Capacitor C62, Resistors R24 and R25 and check IC Z33 by substitution. IC Z33 is a timer that keeps the Disk Drive running for about 3 seconds after a pulse is received at pin 9 of IC Z33.

If the LED on the Disk Drive is not On when the program is running, check for a High logic reading at pin 2 of Flip/Flop IC (Z47) for Drive 0, pin 7 of IC Z47 for Drive 1, pin 10 of IC Z47 for Drive 2 or pin 15 of IC Z47 for Drive 3. If the reading is correct, check IC Z41 by substitution. If the reading is incorrect, check IC Z47 by substitution.

If the Disk Drive is not reading, writing or the Head Stepping Motor is not running and the above circuit checks are good, check ICs Z32, Z34, Z42 and Tri-State Buffer ICs (Z50 and Z51) by substitution.

The operation of pins 34, 35 and 36 of IC Z42 can be checked by running the following Basic program and noting the value of the number X that appears on the Monitor screen when a jumper is connected from ground to one of the pins.

TROUBLESHOOTING (Continued)

NOTE: Turn Off the Computer and disconnect all disk drives from Drive Connector (J3).

```
10 POKE 14304,255: X = PEEK(14316)
20 PRINT "X = ";X
30 FOR T = 1 TO 400: NEXT T
40 GOTO 10
```

Pin 34 of Z42 grounded X = 4
Pin 35 of Z42 grounded X = 2
Pin 36 of Z42 grounded X = 64
Pins 34, 35 and 36 not grounded X = 0

CASSETTE

If Motor Control Relay (K1) is not operating, check for pulses at pins 3 and 4 of IC Z32. If pulses are missing at pin 3, check Mux (Multiplexer) IC (Z39) by substitution. If pulses are present at pin 3 and missing at pin 4 of IC Z32, check IC Z32 by substitution.

If pulses are present at pin 4 of IC Z32, check for a logic reading that toggles between Low and High at pins 1 and 3 of Driver IC (Z18). If the logic reading on pin 1 is incorrect, check IC Z17 by substitution. If the logic reading is good on pin 1 and wrong on pin 3 of IC Z18, check IC Z18 by substitution. If the logic reading is good at pin 3 of IC Z18, check Relay K1 and Diode CR1.

LINE DEFINITIONS

A0 Thru A15 Address Lines
BA0 Thru BA15 Buffered Address Lines
BD0 Thru BD7 Buffered Data Lines
BRD Buffered Read
BWR Buffered Write
CASSIN Cassette Input
CASSOUT Cassette Output
CLK Clock
CLR Clear
D0 Thru D7 Data Lines
DIR SEL Direction Select
DS0 Thru DS3 Data Select
EN1, EN2 Enable
IN Input
INT Interrupt
INDEX Index Pulse
INTRQ Interrupt Request
INTAK Interrupt Acknowledge
M32 Column Address Strobe for 32K Memory
M48 Column Address Strobe for 48K Memory
MA0 Thru MA6 Memory Address Lines
MD0 Thru MD7 Memory Data Lines

MOTOR Disk Motor On Line
MRAS Memory Address Signal
OUT Output
RAS Row Address Strobe
RD Read
RD DATA Read Data
STEP R/W Head Movement Pulse
STROBE Data Strobe Clocking Pulse
SYSRES System Reset
TEST Test
TRK 00 Track 0
WAIT Wait
WR Write
WR DATA Write Data
WR PROT Write Protect
32K Dynamic RAM
37EO RD Memory Address Signal to Interrupt Logic
37E4 WR Memory Address Signal
37E6 WR Memory Address Signal
37E8 RD Memory Address Signal to Printer Logic
48K Dynamic RAM

RADIO SHACK TRS-80
MODEL I LEVEL II

Any Bar above any alphabetical or numerical combination indicates line active in a low (0) state.

SCHEMATIC NOTES

- ✱ Circuitry not used in some versions
- Circuitry used in some versions
- ⊕ See parts list
- ⊥ Ground
- ⏏ Chassis
- ▽ Common tie point

Waveforms and voltages taken from ground, unless noted otherwise.

Voltages, Waveforms and Logic probe readings taken with computer turned On, no keys pressed, unless otherwise noted.

Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on 0 reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7 cm. width with DC reference voltage given at the bottom line of each waveform.

Time in μ sec. per cm, given with p-p reading at the end of each waveform.

Item numbers in rectangles appear in the alignment/adjustment Instructions.

Supply voltages maintained as shown at input.

Voltages measured with digital meter, no signal.

Controls adjusted for normal operation.

Terminal identification may not be found on unit.

Capacitors are 50 volts or less, 10% unless noted.

Electrolytic capacitors are 50 volts or less, 20% unless noted.

Resistors are $\frac{1}{2}$ W or less, 5% unless noted.

Value in () used in some versions.

Measurements with switching as shown, unless noted.

Logic Probe Display

L = Low

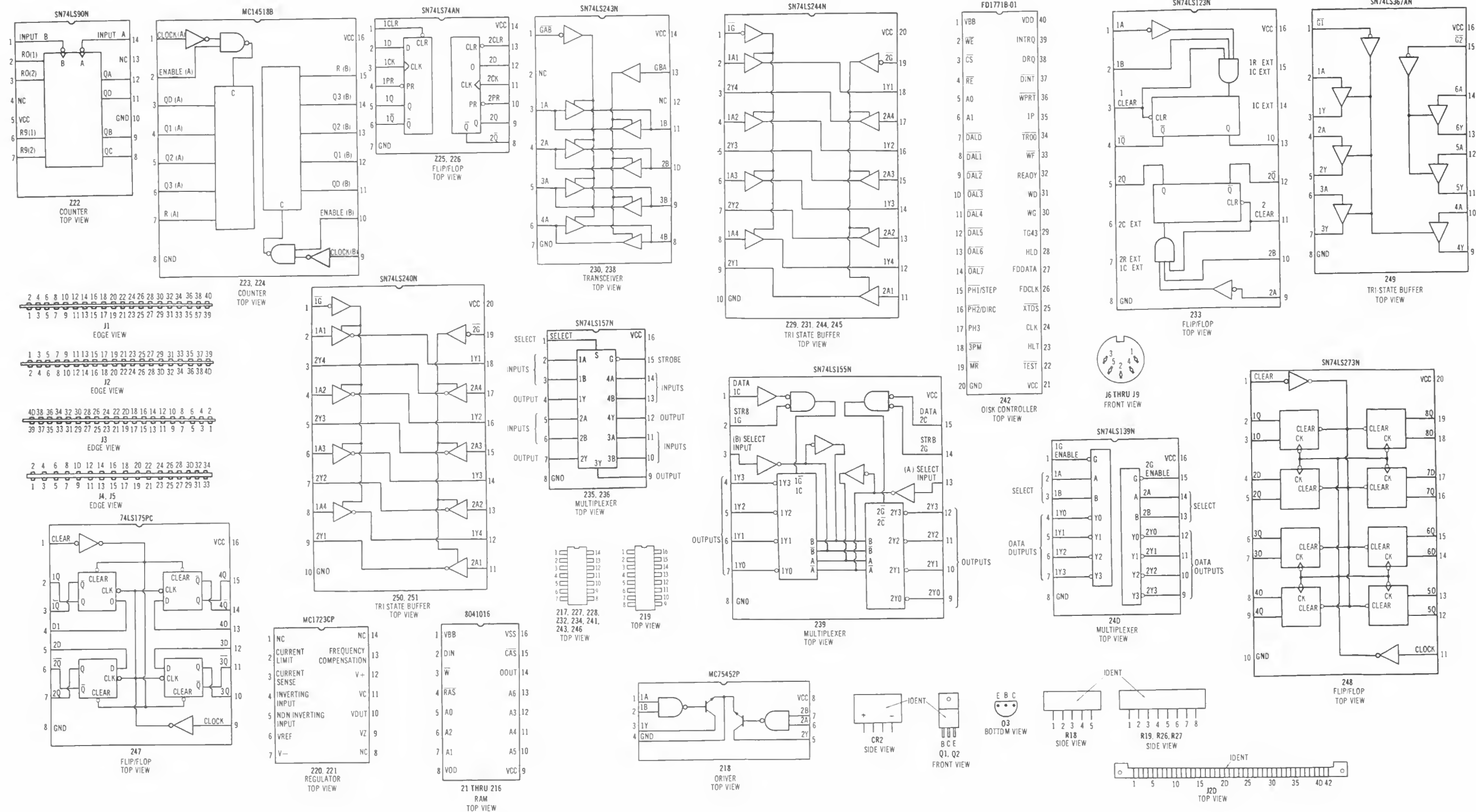
H = High

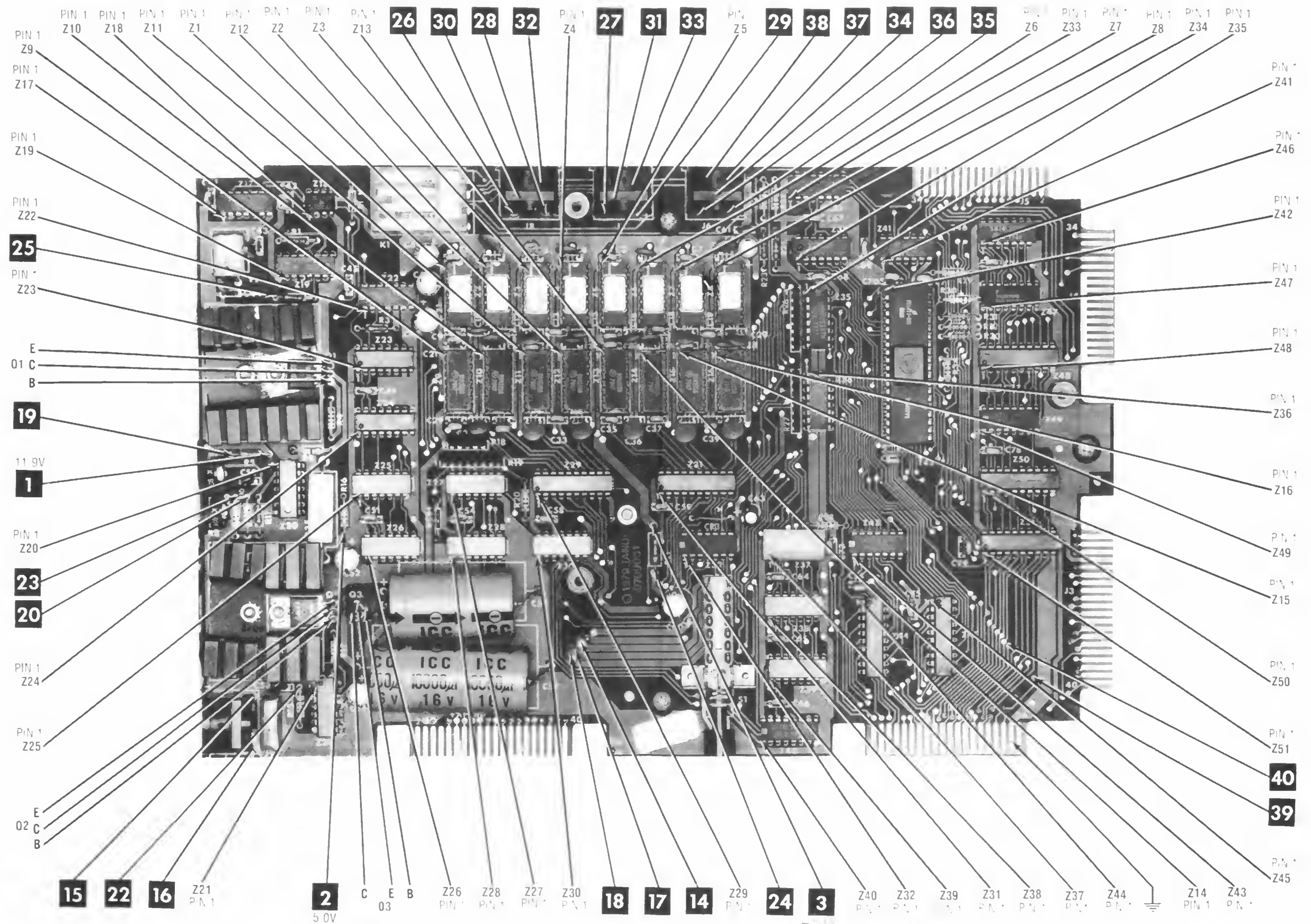
P = Pulse

* = Open (No light On)

(1) Logic readings not taken.

IC PINOUTS & TERMINAL GUIDES



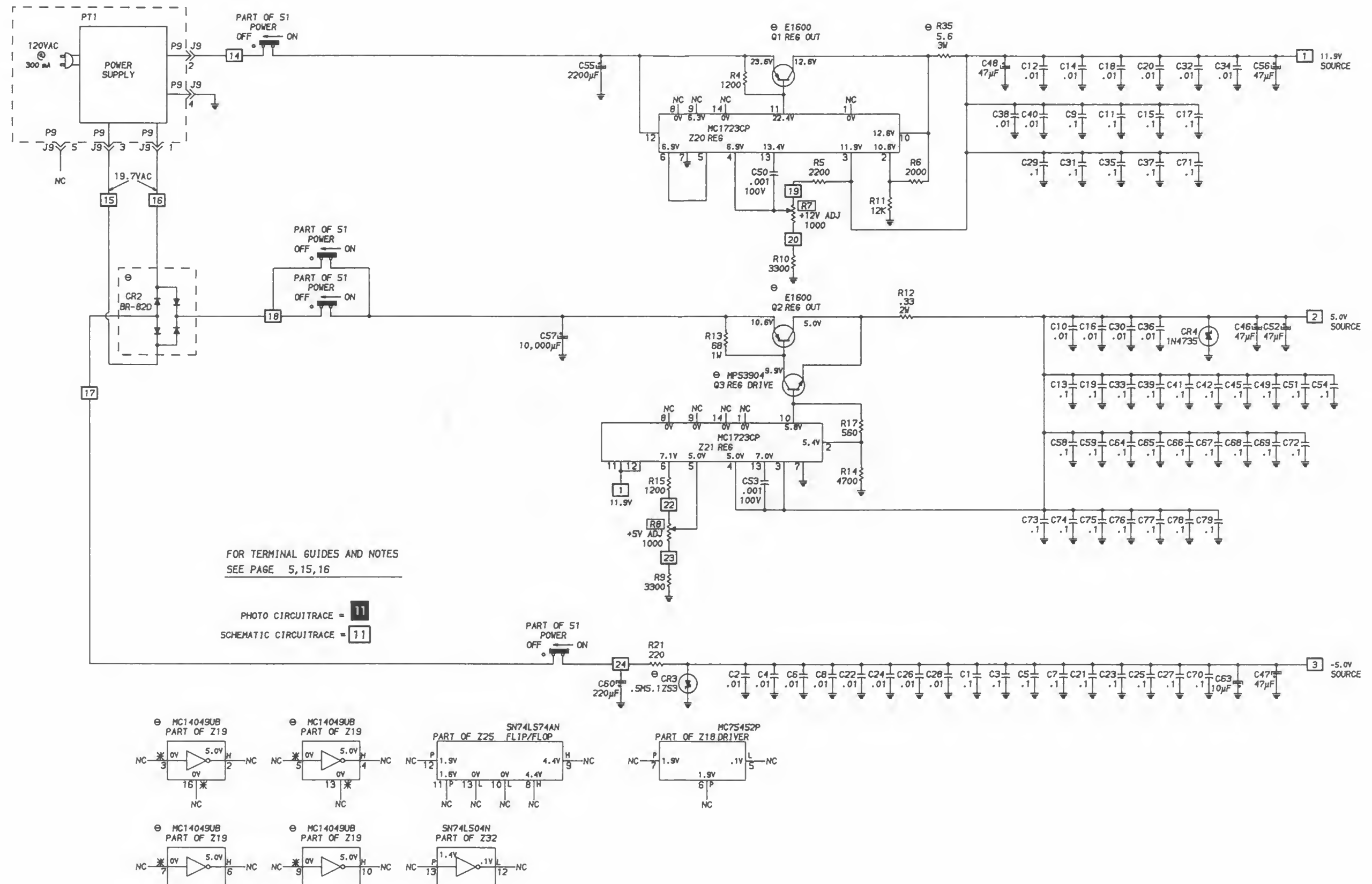


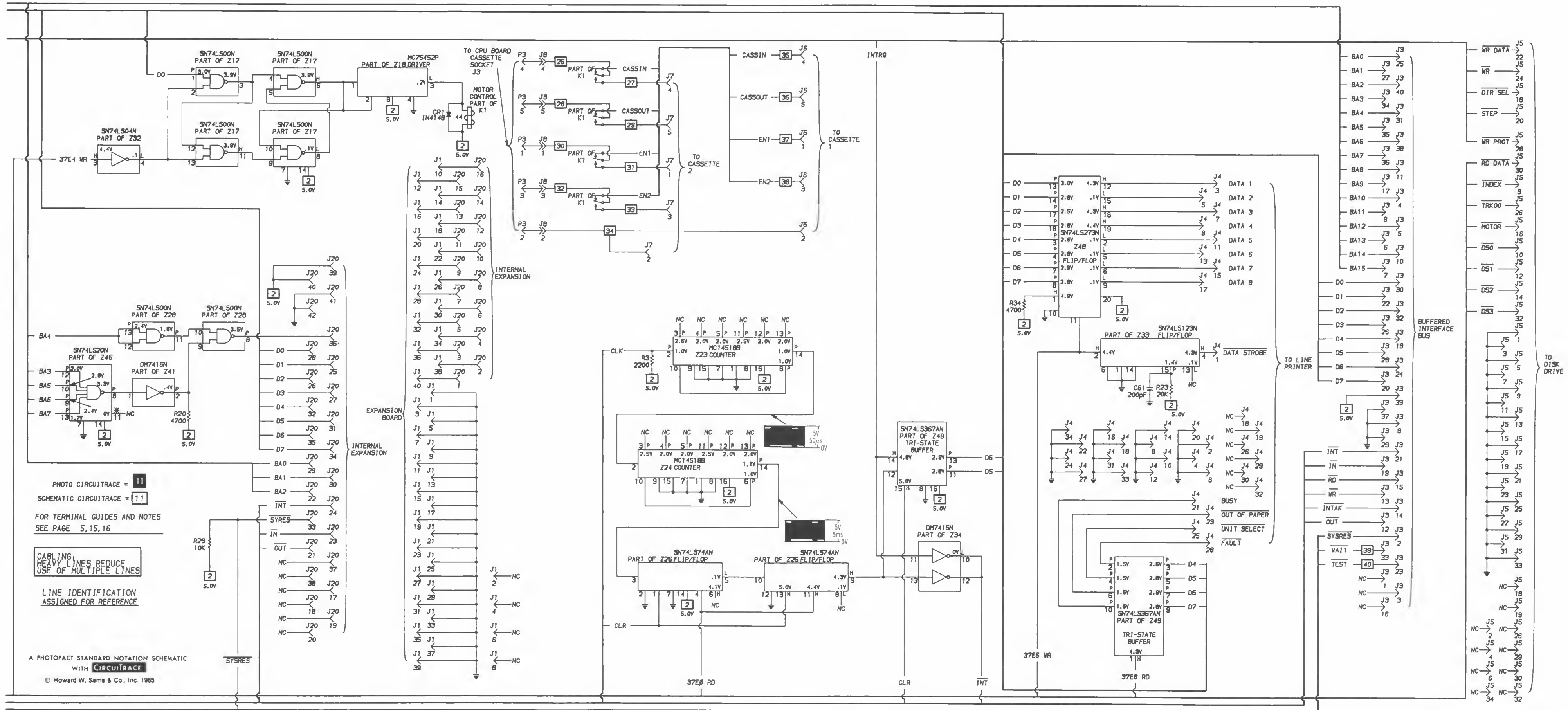
RADIO SHACK TRS-80
MODEL I LEVEL II

EXPANSION INTERFACE BOARD

A Howard W. Sams **CIRCUITRACE** Photo

EXPANSION INTERFACE BOARD





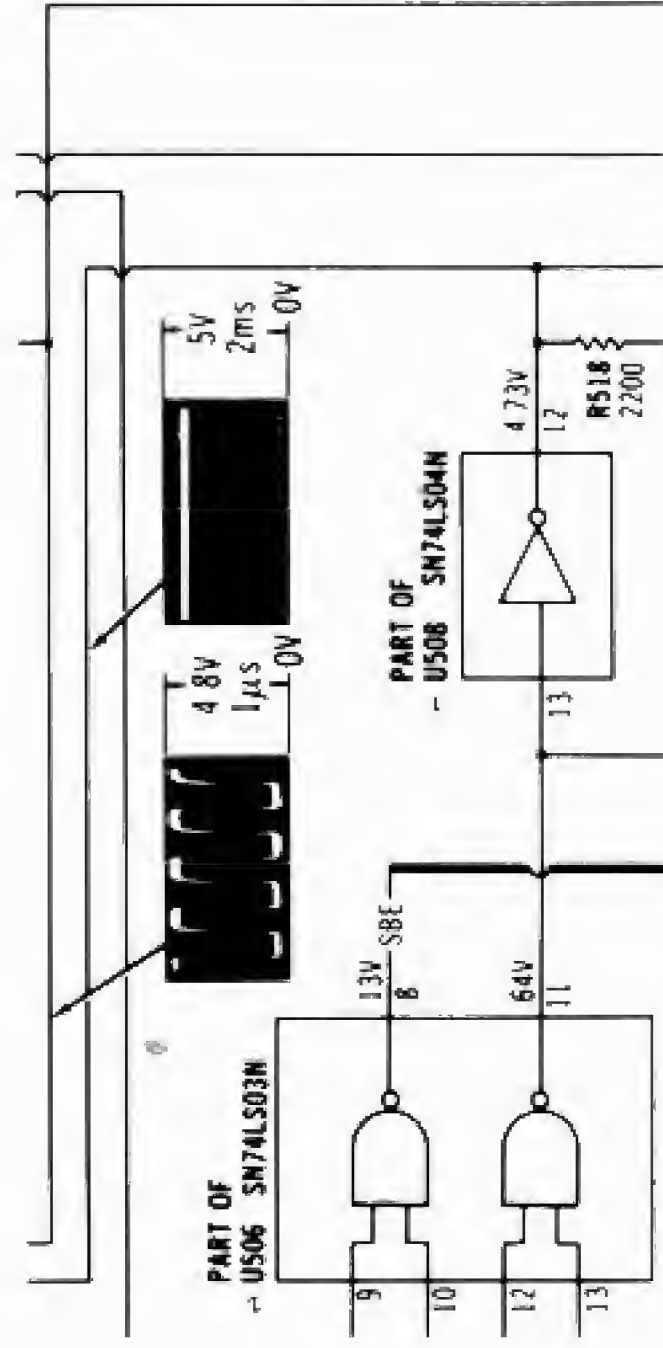


If seal is broken, nonreturnable.

COMPUTERFACTS™ put easy to use, informative technical data right at your fingertips. Each edition includes specific service information on the individual component, along with some overall troubleshooting hints.

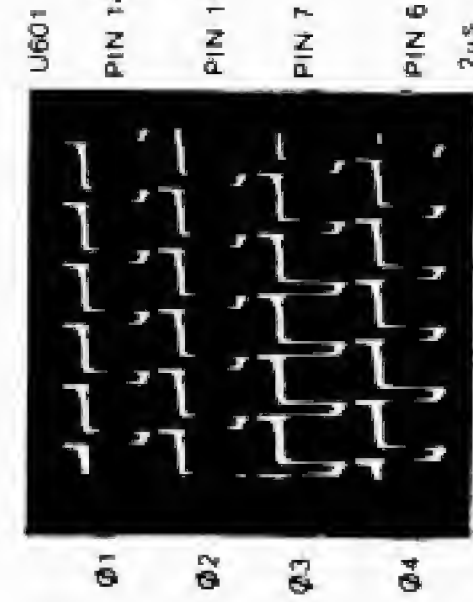
The following information is just a sample of the many valuable time saving features contained in this exclusive Sams COMPUTERFACTS publication:

- Preliminary Service Checks section is an easy to use, step by step guide for the experienced technician or hobbyist, and even beginners.
- SAMS famous industry accepted standardized notation schematics containing CIRCUITRACE®, GRIDTRACE™, waveforms, voltages and stage identification.



- Step by Step Troubleshooting guides the technician through the necessary procedures to quickly locate the problem.

TROUBLESHOOTING



MICROPROCESSOR CHIP (CPU) OPERATION

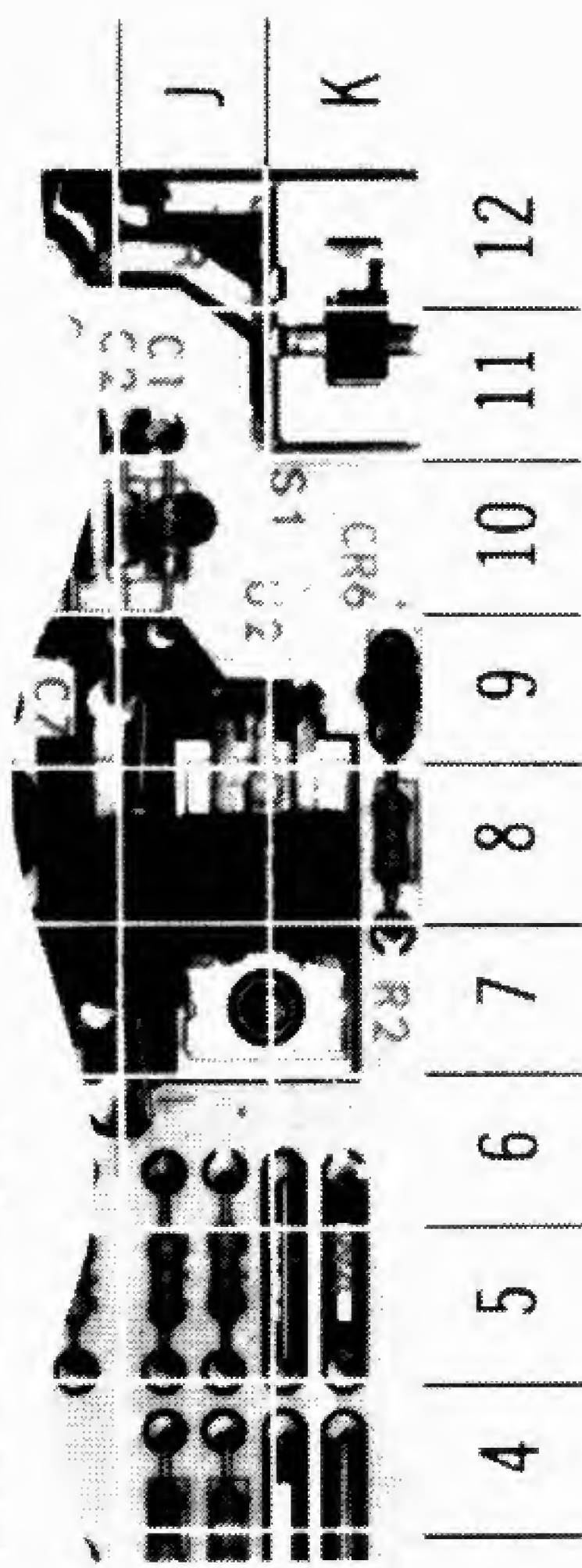
Verify the processor is functioning by checking the signals on the address lines (pins 10 thru 24 of IC U600) and the data lines (pins 41 thru 58) using a logic probe or a scope. If a logic probe is used, refer to the "Logic Chart" for the correct readings. If a scope is used, the waveforms on the address lines (except pins 22 and 23 which have no signal in Power Up mode) should be similar to Figure 1. The waveforms on the data lines should be similar to Figure 2.

- Logic Chart containing logic probe readings to isolate defective circuitry and components.

LOGIC

| PIN NO. | IC U100 | PIN NO. | IC U100 | PIN NO. | IC U100 | IC U102 | IC U103 | IC U104 | IC U105 | IC U106 | IC U107 | IC U108 | IC U109 |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1 | P | 21 | P | 1 | L | L | L | L | L | L | L | L | L |
| 2 | P | 22 | P | 2 | P | P | P | P | P | P | P | P | P |
| 3 | P | 23 | P | 3 | H | H | H | H | H | H | H | H | H |

- Quick Component Location using the SAMS exclusive GRIDTRACE, CIRCUITRACE, and component photographs.



- Complete Components Parts List in an easy to use format with field replacements shown when possible. SAMS unique semiconductor, chip and IC cross-reference gives you many replacements to choose from and is available at your Electronic Distributor.

SEMICONDUCTORS (Select replacement for best results)

| ITEM No. | TYPE No. | MFR PART No. | REPLACEMENT DATA | | | | | |
|----------------|----------|--------------|------------------|---------------------------|-------------------|--------------|--------------|------------------|
| | | | EGG PART No. | GENERAL ELECTRIC PART No. | MOTOROLA PART No. | NTE PART No. | RCA PART No. | WORKMAN PART No. |
| D102 | 1S553 | 1149-2576 | ECG519 | GE-514 | 1N4935 | NTE519 | SK9091/177 | WEP925/519 |
| D103 | 1N60FM | 1149-2527 | ECG109 | 1N60 | 1N4004 | NTE109 | SK3088 | WEP134/109 |
| D201 | 1N4004GP | 1201-4205 | ECG116 | GE-504A | 1N4935 | NTE116 | SK3312 | WEP157 |
| D501 thru D503 | 1S553 | 1149-2576 | ECG519 | GE-514 | 1N4935 | NTE519 | SK9091/177 | WEP925/519 |

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